

# GB170

## Service Manual



**LG Electronics**

# Table Of Contents

|  |            |  |  |
|--|------------|--|--|
| <b>1. INTRODUCTION.....</b>                                  | <b>3</b>   |  |  |
| 1.1 Purpose.....   | 3          |  |  |
| 1.2 Regulatory Information.....                              | 3          |  |  |
| <b>2. PERFORMANCE.....</b>                                   | <b>5</b>   |  |  |
| 2.1 H/W Features.....  | 5          |  |  |
| 2.2 S/W Features.....  | 6          |  |  |
| <b>3. TECHNICAL BRIEF.....</b>                               | <b>16</b>  |  |  |
| 3.1 Digital Main Processor(MT6225).....                      | 16         |  |  |
| 3.2 Power Amplifier Module(SKY77518).....                    | 23         |  |  |
| 3.3 Transceiver Module(AD6548).....                          | 24         |  |  |
| 3.4 PMIC (MT6318).....                                       | 26         |  |  |
| 3.5 Memory Module (PF38F4050M0Y0CG).....                     | 28         |  |  |
| 3.6 FM Radio Module (Si4708).....                            | 32         |  |  |
| 3.7 Antenna Switch Module (B9308).....                       | 34         |  |  |
| 3.8 LCD Interface.....                                       | 35         |  |  |
| 3.9 SIM& Micro SD Card Interface.....                        | 37         |  |  |
| 3.10 KEYPAD Interface.....                                   | 38         |  |  |
| 3.11 Battery Charging Block Interface.....                   | 39         |  |  |
| 3.12 Audio Interface.....                                    | 40         |  |  |
| 3.13 Vibrator Interface.....                                 | 42         |  |  |
| <b>4. TROUBLE SHOOTING.....</b>                              | <b>43</b>  |  |  |
| 4.1 Power On Trouble.....                                    | 43         |  |  |
| 4.2 SIM Card Trouble.....                                    | 45         |  |  |
| 4.3 Vibrator Trouble.....                                    | 47         |  |  |
| 4.4 Keypad Trouble.....                                      | 48         |  |  |
| 4.5 RTC Trouble.....   | 50         |  |  |
| 4.6 Key Backlight Trouble.....                               | 53         |  |  |
| 4.7 LCM Backlight Trouble.....                               | 56         |  |  |
| 4.8 LCM Trouble.....   | 58         |  |  |
| 4.9 Microphone Trouble.....                                  | 60         |  |  |
| 4.10 Receiver Trouble.....                                   | 62         |  |  |
| 4.11 Speaker Trouble.....                                    | 64         |  |  |
| 4.12 Headphone Trouble.....                                  | 66         |  |  |
| 4.13 Charging Trouble.....                                   | 69         |  |  |
| 4.14 FM Radio Trouble.....                                   | 71         |  |  |
| 4.15 RF Trouble.....   | 73         |  |  |
| <b>5. DOWNLOAD.....</b>                                      | <b>78</b>  |  |  |
| 5.1 Download setup.....                                      | 78         |  |  |
| 5.2 Download Process.....                                    | 79         |  |  |
| <b>6. BLOCK DIAGRAM.....</b>                                 | <b>87</b>  |  |  |
| <b>7. CIRCUIT DIAGRAM.....</b>                               | <b>88</b>  |  |  |
| <b>8. BGA IN PIN Check.....</b>                              | <b>96</b>  |  |  |
| <b>9. PCB LAYOUT.....</b>                                    | <b>99</b>  |  |  |
| <b>10.ENGINEERING MODE.....</b>                              | <b>101</b> |  |  |
| <b>11. CALIBRATION.....</b>                                  | <b>105</b> |  |  |
| 11.1 Test Equipment Setup.....                               | 105        |  |  |
| 11.2 Calibration Steps.....                                  | 106        |  |  |
| <b>12. STAND ALONE TEST.....</b>                             | <b>145</b> |  |  |
| 12.1 Test Configuration.....                                 | 145        |  |  |
| 12.2 META tool Install process.....                          | 146        |  |  |
| 12.3 Rx Test.....  | 147        |  |  |
| 12.4 Tx Test.....  | 153        |  |  |
| <b>13. EXPLODED VIEW&amp;<br/>REPLACEMENT PART LIST.....</b> | <b>155</b> |  |  |
| 13.1 Exploded View.....                                      | 155        |  |  |
| 13.2 Replacement Part.....                                   | 157        |  |  |

# **1. INTRODUCTION**

## **1.1 Purpose**

This manual provides information necessary to repair, description and download the features of this model.

## **1.2 Regulatory Information**

### **A. Security**

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services.

System users are responsible for the security of own system. There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common-carrier telecommunications service of facilities accessed through or connected to it.

The manufacturer will not be responsible for any charges that result from such unauthorized use.

### **B. Incidence of Harm**

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

### **C. Changes in Service**

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the this phone or compatibility with the network, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

### **D. Maintenance Limitations**

Maintenance limitations on this model must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs except as specifically noted in this manual.

Therefore, note that authorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

### **E. Notice of Radiated Emissions**

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

## **F. Pictures**

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

## **G. Interference and Attenuation**

Phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

## **H. Electrostatic Sensitive Devices**

### **ATTENTION**

**Boards, which contain Electrostatic Sensitive Devices(ESD),are indicated  by the sign .**

**Following information is ESD handing:**

- . Service personnel should ground themselves by using a wrist strap when exchange system boards.
- . When repairs are made to a system board , they should spread the floor with anti-static mat which is also grounded .
- . Use a suitable, grounded soldering iron .
- . Keep sensitive parts in these protective packages until these are used.
- . When returning system boards or parts like EEPROM to the factory, use the protective packages as described.



## 2. PERFORMANCE

### 2.1 H/W Features

|                             |                                    |                         |
|-----------------------------|------------------------------------|-------------------------|
| Solution                    | MT6225                             | Media Tek / AIT         |
| Form Factor                 | Bar type                           |                         |
| Dimension (mm)              | 103 x 46 x 13.65                   |                         |
| RF Band                     | Dual Band 900/1800                 | Internal Antenna        |
| Data                        | GPRS Class 10                      |                         |
| Main Display                | 1.5" TFT 65K color, 128x128 Pixels |                         |
| Battery                     | 950 mA h                           | Same as LG6/7           |
| Audio player                | Yes                                | MP3/AAC/(AAC+ w/o DRM)  |
| FM Receiver                 | Yes , US/Europe band(87.5~108MHz)  |                         |
| Loud Speaker                | Yes                                |                         |
| Memory Size                 | 256Mb NOR Flash +64Mb PSRAM        | 6225 support 1.8 or not |
| User Memory                 | Yes                                | 6M Bytes                |
| Memory Card                 | Yes                                | Micro SD                |
| Scheduled FM recording      | Yes                                |                         |
| FM as alarm                 | Yes                                |                         |
| Audio player--real resuming | Yes                                | For MP3 only            |
| USB                         | Yes                                | Slave 1.1               |
| IrMC                        | No                                 |                         |
| WAP                         | Yes                                | V2.0                    |
| Java                        | Yes                                |                         |
| DRM                         | No                                 | OMA DRM v1.0            |
| Music Equalizer             | Yes                                | Follow MTK              |
| In flight mode              | Yes                                |                         |

## 2.2 S/W Features

### 2.2.1 General Features

| Function                         | Target Specification  | Parameter      | Support |
|----------------------------------|---|----------------|---------|
| Basic Display                    | RSSI  | (6 Level, 0~5) | Y       |
|                                  | Battery Indicator   | (4 Level, 0~3) | Y       |
|                                  | Icons Indicator   |                | Y       |
|                                  | Others reference to "Phone Personalization Setting"   |                | Y       |
| Speech Codec                     | FR/EFR/HR/AMR   |                | Y       |
| Keypad                           | Number of Keys: 21Key (include 12 alphanumeric/number keys (0-9,#,*), 4 function keys, 5 way navigation keys) |                | Y       |
|                                  | Clear key   |                | N       |
|                                  | International Access (+)(long 0)  |                | Y       |
| User Profile<br>(Audio Settings) | User Selectable and Customizable Profiles<br>(profiles: Normal, Silent, Outdoor, Flight mode)                 |                | Y       |
|                                  | Auto-detect and activated profiles  |                | Y       |
|                                  | <b>Key Tone</b>   |                |         |
|                                  | Key Tone Volume (6 Level - 0 ~ 5, 0 for Mute)   |                | Y       |
|                                  | Key tone setting (4 sets: Silent, Click, Tone, English Human voice)   |                | Y       |
|                                  | <b>Ring Tone</b>  |                |         |
|                                  | Ring Tone Volume (6 Level - 0 ~ 5, 0 for Mute)  |                | Y       |
|                                  | Built-in Ring Tone Pattern: 20  |                | Y       |
|                                  | Customizable Ring Tone Link: 5  |                | Y       |
|                                  | <b>Intelligent Call Alert</b>   |                |         |
|                                  | Digits To Sound Synthesizing  |                | Y       |
|                                  | <b>Alert Type</b>   |                |         |
|                                  | 5 Types - Ring, Vibrate, Ring & vibrate, Ring after vibrate, Silent   |                | Y       |
|                                  | <b>Power On Tone</b>  |                |         |
|                                  | Built-in Ring Tone Pattern: 5 (include Silent)  |                | Y       |
|                                  | <b>Power Off Tone</b>   |                |         |
|                                  | Built-in Ring Tone Pattern: 5 (include Silent)  |                | Y       |
|                                  | <b>Message Tone</b>   |                |         |
|                                  | Built-in Ring Tone Pattern: 5   |                | Y       |
|                                  | <b>Warning Tone</b>   |                |         |
|                                  | Built-in Ring Tone Pattern:<br>1 (Only On/Off operation)  |                | Y       |
|                                  | <b>Error Tone</b>   |                |         |
|                                  | Built-in Ring Tone Pattern:<br>1 (Only On/Off operation)  |                | Y       |
|                                  | <b>Camp On Tone</b>   |                |         |

| Function                        | Target Specification   | Parameter | Support |
|---------------------------------|--|-----------|---------|
|                                 | Built-in Ring Tone Pattern:<br>1 (Only On/Off operation)                     |           | Y       |
|                                 | <b>Connect Tone</b>  |           |         |
|                                 | Built-in Ring Tone Pattern:<br>1 (Only On/Off operation)                     |           | Y       |
|                                 | Status LED   |           | N       |
|                                 | Charger-in Status LED  |           | Y       |
|                                 | Answer Mode  |           | Y       |
|                                 | Any Key Answer   |           | Y       |
|                                 | Auto (Only available for headset mode while headset plugged in)              |           | Y       |
| Personal Information Management | Calendar - Month view only   |           | Y       |
|                                 | To do list - 6 fields (Date, Start time, End time, Note, Alarm, Repeat)      |           | Y       |
| Tools and Utilities             | <b>Alarm</b>   |           |         |
|                                 | 5 sets of Alarm  |           | Y       |
|                                 | 4 major fields for each set - On/Off, Time, Repeat type, Audio option        |           | Y       |
|                                 | <b>World Clock</b>   |           |         |
|                                 | Cities list: China(49),IND(51),CIS(65) cities                                |           | Y       |
|                                 | Daylight saving time support: activated by user selection                    |           | Y       |
|                                 | Home city set  |           | Y       |
|                                 | <b>Calculator</b>  |           |         |
|                                 | Addition, Subtraction, Multiplication, Division                              |           | Y       |
|                                 | <b>Unit Converter</b>  |           |         |
|                                 | Weight, Length   |           | Y       |
|                                 | <b>Currency Converter</b>  |           |         |
|                                 | <b>Health</b>  |           | Y       |
|                                 | BMI, Menstrual   |           | Y       |
| Phone Personalization Setting   | Greeting Text  |           | Y       |
|                                 | Shortcuts  |           | Y       |
|                                 | Flight Mode  |           | Y       |
|                                 | Time and Date Setting  |           | Y       |
|                                 | Wallpaper  |           | Y       |
|                                 | Screen Saver   |           | N       |
|                                 | Power On Animation   |           | Y       |
|                                 | Power Off Animation  |           | Y       |
|                                 | LCD Backlight  |           | Y       |
|                                 | PLMN/Service Indicator (Display of PLMN Name/Service Provider Name from SIM) |           | Y       |
|                                 | Date Time Display  |           | Y       |
|                                 | Own Number Display   |           | Y       |

| Function     | Target Specification  | Parameter | Support |
|--------------|---|-----------|---------|
|              | Restore Factory Default Setting   |           | Y       |
| Security     | Phone Lock  |           | Y       |
| Input Method | <b>Engine</b>   |           |         |
|              | T9  |           | Y       |
|              | <b>Support Language</b>   |           |         |
|              | Depends on customer and market requirement.<br>Total supported languages will be limited to memory condition. |           | Y       |
|              | <b>Predictive word input</b>  |           | Y       |
| Game         | 3 embedded Java game  |           | Y       |
|              | Settings:<br>BGM, Sound Effect, Vibration   |           | Y       |

## 2.2.2 Networking Features

| Function        | Target Specification   | Parameter | Support |
|-----------------|--|-----------|---------|
| GPRS            | GPRS Multi slot Class 10   |           | Y       |
| Data Service    | BS 24 - 26 (2400-9600 bit/s), asynchronous, non-transparent, UDI.<br>CSD rate up to 9.6K bit/s |           | Y       |
| Call History    | Last Dialed Number : 50  |           | Y       |
|                 | Last Received Number : 50  |           | Y       |
|                 | Last Missed Number : 50  |           | Y       |
|                 | Scratch Pad Memory(Save an input number in call) : 1   |           | Y       |
| Call Cost       | Last Call Time   |           | Y       |
|                 | Total Dialed Call Time   |           | Y       |
|                 | Total Received Call Time   |           | Y       |
|                 | Last Call Cost   |           | Y       |
|                 | Total Cost   |           | Y       |
|                 | Max Cost   |           | Y       |
|                 | Price Per Unit   |           | Y       |
| GPRS Counter    | Last Sent (unit in Byte)   |           | Y       |
|                 | Last Received (unit in Byte)   |           | Y       |
|                 | All Sent (unit in Byte)  |           | Y       |
|                 | All Received (unit in Byte)  |           | Y       |
| Call Management | Call Swap  |           | Y       |
|                 | Call Retrieve  |           | Y       |
|                 | Automatic Redial   |           | Y       |
|                 | Speed Dialing  |           | Y       |

| Function                            | Target Specification   | Parameter | Support |
|-------------------------------------|--|-----------|---------|
|                                     | Last Number Redial   |           | Y       |
| Call Related Supplementary Services | Call Hold  |           | Y       |
|                                     | Call Waiting   |           | Y       |
|                                     | Calling Line Identity Presentation   |           | Y       |
|                                     | Calling Line Identity Restriction  |           | Y       |
|                                     | Connected Identification Restriction   |           | Y       |
|                                     | Call Divert All voice Calls  |           | Y       |
|                                     | Call Divert if unreachable   |           | Y       |
|                                     | Call Divert if no answer   |           | Y       |
|                                     | Call Divert if busy  |           | Y       |
|                                     | Call Divert all data calls   |           | Y       |
|                                     | Cancel all divert  |           | Y       |
|                                     | Call Barring All Outgoing Calls  |           | Y       |
|                                     | Call Barring All Outgoing International Calls  |           | Y       |
|                                     | Call Barring All outgoing International except home  |           |         |
|                                     | Call Barring All incoming Calls  |           | Y       |
|                                     | Call Barring All incoming Calls when roaming   |           | Y       |
|                                     | Multi-party Call (up to 7 calls, 5 in conference, 1 on held, 1 waiting)  |           | Y       |
|                                     | Line switching (Line1, Line2)  |           | Y       |
|                                     | Call reminder (Off, Single, Periodic)  |           |         |
|                                     | Closed User Group  |           |         |
| Phone Book                          | Quick Search (Notice: Quick search function only works in Phonebook, SMS and MMS. In other application, this phone supports regular search.) |           | Y       |
|                                     | Alpha Store and Recall   |           | Y       |
|                                     | Access Phone Book in call  |           | Y       |
|                                     | Copy & Move  |           | Y       |
|                                     | Fixed Dial Number  |           | Y       |
|                                     | Service Dial Number  |           | Y       |
|                                     | Speed Dial Number  |           | Y       |
|                                     | SOS Number   |           | Y       |
|                                     | Entry : <b>1000</b> names (10 fields: Name, Mobile, Home, Office, Fax, Email, Anniversary, Ringtone, Group, memo.)                           |           | Y       |
|                                     | Caller Group-7 caller group-Friends, Family, VIP, Colleague, Group1, Group2, No group  |           | Y       |

| Function | Target Specification   | Parameter   | Support |
|----------|--|-------------|---------|
|          | Own Numbers: User can change the own numbers of handset. (Sets of own numbers depends on SIM)  |             | Y       |
|          | vCard: (Edit, Send and Receive. 7 fields – Name, Mobile, Home, Company Name, Email Address, Office Number, Fax Number)   | Version 2.1 | Y       |
|          | Note: This phone doesn't support phone number search.  |             | Y       |
| Message  | <b>SMS</b>   |             | Y       |
|          | Standard SMS   |             | Y       |
|          | SMS Reply Path   |             | Y       |
|          | SMS Delivery Report<br><b>Valid period (1 hour/12 hours/1 day/1 week/Maximum)</b><br><b>Message Type (Text, Fax, Page, Email) Message Indication Type refer to GSM 03.40</b> |             | Y       |
|          | Basic text-only SMS as described in 3GPP TS 23.040 R5  |             | Y       |
|          | Notice: This phone doesn't support video ring tone via SMS   |             | Y       |
|          | <b>SMS Character Sets Support</b>  |             |         |
|          | GSM7   |             | Y       |
|          | UCS-2  |             | Y       |
|          | <b>EMS</b>   |             |         |
|          | EMS Standard as described in 3GPP TS 23.040 R5 excluding WVG   |             | Y       |
|          | <b>EMS Text Format</b>   |             |         |
|          | Text Style : Normal, Bold, Italic, Underlined, Strikethrough   |             | Y       |
|          | Text Alignment : Left, Right, Center   |             | Y       |
|          | Text Size : Normal, Large, Small   |             | Y       |
|          | <b>EMS Image Support</b>   |             |         |
|          | 1-bit small image 16x16 pixels black and white   |             | Y       |
|          | 1-bit large image 32x32 pixels black and white   |             | Y       |
|          | 1-bit variable image in single SMS packet  |             | Y       |
|          | Extended black and white 1-bit image up to 255x255 pixels  |             | Y       |
|          | Extended 6-bit image up to 255x255   |             | Y       |
|          | Pre-defined animation  |             | Y       |

| Function | Target Specification   | Parameter | Support |
|----------|--|-----------|---------|
|          | User-defined small animation 8x8 pixel 4-frame black and white           |           | Y       |
|          | User-defined large animation 16x16 pixel 4-frame black and white         |           | Y       |
|          | Pre-defined sound  |           | Y       |
|          | User-defined i-Melody up to 128 bytes                                    |           | Y       |
|          | LZSS compression algorithm   |           | Y       |
|          | Re-use extended object   |           | Y       |
|          | Object Distribution  |           | Y       |
|          | User Prompt Indicator  |           | Y       |
|          | Hyperlink format element   |           | Y       |
|          | Extended Object Distribution   |           | Y       |
|          | <b>EMS Character Sets Support</b>  |           | Y       |
|          | GSM7   |           | Y       |
|          | UCS-2  |           | Y       |
|          | <b>EMS Miscellaneous</b>   |           | Y       |
|          | SMS Concatenation ( 8 Segments for MT/MO)                                |           | Y       |
|          | SMS Compression  |           | Y       |
|          | <b>MMS</b>   |           | Y       |
|          | MMS Standard as described in 3GPP TS 23.140 V4.8.0                       |           | Y       |
|          | Extract media from Message   |           | Y       |
|          | Insert Media into message  |           | Y       |
|          | OTA provisioning partially support (Network Profile setting              |           | Y       |
|          | Auto download mode   |           | Y       |
|          | Manual download mode   |           | Y       |
|          | Operator can pre-configure the delivery mode                             |           | Y       |
|          | MMS notification with icon or Pop-up message display)                    |           | Y       |
|          | <b>MMS Message Format</b>  |           | Y       |
|          | MMS SMIL (A subset of SMIL descried in the MMS Conformance Document 1.2) |           | Y       |
|          | <b>MMS Character Sets Support</b>  |           | Y       |
|          | US-ASCII   |           | Y       |
|          | Unicode  |           | Y       |
|          | ISO-8859-1   |           | Y       |
|          | UTF-16   |           | Y       |
|          | UTF-8  |           | Y       |

| Function       | Target Specification   | Parameter | Support |
|----------------|--|-----------|---------|
|                | <b>MMS Images Support</b>  |           | Y       |
|                | WBMP Wireless bitmap   |           | Y       |
|                | GIF87  |           | Y       |
|                | GIF89a   |           | Y       |
|                | JPEG (sw decode)   |           | Y       |
|                | <b>MMS Sound Formats Support</b>   |           | Y       |
|                | WAV  |           | Y       |
|                | AMR  |           | Y       |
|                | MIDI   |           | Y       |
|                | MP3  |           | Y       |
|                | <b>MMS Miscellaneous</b>   |           | Y       |
|                | Multipart binary MIME  |           | Y       |
|                | <b>Storage</b>   |           | Y       |
|                | Separated Inbox folder for SMS and MMS   |           | Y       |
|                | Separated Outbox folder for SMS and MMS  |           | Y       |
|                | Total 150 SMS in the storage of phone plus SIM including Inbox, outbox, sent and draft   |           | Y       |
|                | Total 100 MMS in the phone storage including Inbox, draft and Outbox<br>Notice: Total MMS count need depends on user memory space. |           | Y       |
|                | <b>Common Operation</b>  |           | Y       |
|                | Write Message  |           | Y       |
|                | Read Message   |           | Y       |
|                | Edit Message<br>(For MMS, Edit only conformance messages, unknown media not supported, unknown SMIL not supported)                 |           | Y       |
|                | Reply Message  |           | Y       |
|                | Send Message   |           | Y       |
|                | Delete Message   |           | Y       |
|                | Forward Message  |           | Y       |
|                | Use Sender's Number  |           | Y       |
|                | Message Templates  |           | Y       |
|                | Extract media from Message (MMS/EMS)   |           | Y       |
|                | Store Media (MMS/EMS)  |           | Y       |
|                | Delete Media (MMS/EMS)   |           | Y       |
| Cell Broadcast | Read Cell Broadcast  |           | Y       |



| Function | Target Specification                                   | Parameter | Support |
|----------|--|-----------|---------|
|          | Cell Broadcast Mode: Receive On/Off                    |           | Y       |
|          | Cell Broadcast Message Language                        |           | Y       |
|          | Channel Setting  |           | Y       |
| Network  | Automatic Network Selection                            |           | Y       |
|          | Manual Network Selection                               |           | Y       |
|          | Network Service Status                                 |           | Y       |
|          | Preferred Network (User definition)                    |           | Y       |
|          | GPRS connection mode selection: Always, When Needed    |           | Y       |
| SIM      | <b>Common Operation</b>                                |           | Y       |
|          | SIM Application Toolkit (Release 98 Class 2 certified) |           | Y       |
|          | Prepaid SIM operation                                  |           | Y       |
|          | <b>Security</b>  |           | Y       |
|          | PIN  |           | Y       |
|          | Personalization (Service provider lock, Network lock)  |           | Y       |
| DTMF     | DTMF Signaling   |           | Y       |
|          | DTMF Enable & Disable                                  |           | Y       |

## 2.2.3 Multimedia Features

| Function                         | Target Specification  | Parameter | Support |
|----------------------------------|---|-----------|---------|
| Image Viewer<br>My stuff / photo | Thumbnail supported   |           | Y       |
|                                  | Browse Style:<br>List, Matrix   |           | Y       |
|                                  | View  |           | Y       |
|                                  | Forward:<br>To Wallpaper, Phonebook, <del>Screen-Saver</del> , <del>Power On Display</del> , <del>Power Off Display</del> , MMS |           | Y       |
|                                  | Rename  |           | Y       |
|                                  | Delete  |           | Y       |
|                                  | Delete All  |           | Y       |
|                                  | Sort:<br>By Name, Type, <del>Time</del> , <del>Size</del> , <del>None</del> , <del>Date</del>                                   |           | Y       |
|                                  | Storage Selection:<br>Get list from Phone, Memory card (Only available when external memory card supported)                     |           | Y       |
|                                  | <b>Image Format Support</b>   |           | Y       |
|                                  | JPEG Baseline   |           | Y       |

| Function       | Target Specification  | Parameter | Support  |
|----------------|---|-----------|----------|
|                | GIF87a  |           | Y        |
|                | GIF89a  |           | Y        |
|                | WBMP  |           | Y        |
|                | BMP   |           | Y        |
| Music Player   | Play  |           | Y        |
|                | Pause   |           | Y        |
|                | Resume  |           | Y        |
|                | Stop  |           | Y        |
|                | Next  |           | Y        |
|                | Previous  |           | Y        |
| Music Player   | Storage Selection:<br>Get list from Phone, Memory card<br>(Only available when external<br>memory card supported) |           | Y        |
|                | Auto-Generate Playlist  |           | Y        |
|                | Skin: 2 skins   |           | Y        |
|                | Repeat Mode:<br><b>All, All off, One, One off</b>   |           | Y        |
|                | Shuffle Play  |           | Y        |
|                | Background Play   |           | Y        |
|                | Equalizer Setting: 8 sets<br>Normal, Bass, Dance, Classical,<br>Treble, Party, Pop, Rock                          |           | Y        |
|                | Volume Control:<br>11 level (0 ~ 10, 0 for Mute)  |           | Y        |
|                | Playlist Edit:<br>Add, Remove, Remove All   |           | Y        |
|                | <b>Sound Format Support</b>   |           | <b>Y</b> |
|                | MP3   |           | Y        |
|                | AMR   |           | Y        |
|                | <b>MIDI</b>   |           | Y        |
|                | <b>WAV</b>  |           | Y        |
|                | AAC   |           | Y        |
|                | <b>AAC+</b>   |           | <b>Y</b> |
| Sound Recorder | Storage Selection:<br>Phone, Memory card<br>(Only available when external<br>memory card supported)               |           | Y        |
|                | Encode Format:<br>AMR   |           | Y        |
|                | Record  |           | Y        |

| Function | Target Specification  | Parameter | Support |
|----------|---|-----------|---------|
|          | Pause   |           | Y       |
|          | Resume Recording  |           | Y       |
|          | Stop  |           | Y       |
| FM Radio | Frequencies: 87.5 ~ 108.0<br>Skin: 2 skins  |           | Y       |
|          | User definable Preset Channel List  |           | Y       |
|          | Channel Auto Search   |           | Y       |
|          | Background Play   |           | Y       |
|          | Record  |           | Y       |
|          | Record Format:<br>AMR   |           | Y       |
|          | Record Storage:<br>Phone memory, SD card (Option,<br>follow common UI)<br>(Only available when external<br>memory card supported) |           | Y       |
|          | Preset Channel List generated by<br>auto search   |           | Y       |
| JAVA     | MIDP 2.0  |           | Y       |
|          | CLDC 1.0  |           | Y       |
|          | <b>Heap Memory Limit 2MB</b><br>Support JSR 139,118,120,135,185   |           | Y       |

## 2.2.4 Connectivity Features

| Function | Target Specification   | Parameter | Support |
|----------|--|-----------|---------|
| WAP      | WAP 2.0 Spec.  |           | Y       |
|          | WAP Push OTA/Message   |           | Y       |
|          | WAP Provisioning Service   |           | Y       |
|          | CSD/GPRS data connection   |           | Y       |
|          | Bookmark   |           | Y       |
|          | Wireless Telephony Application<br>(WTA) support:<br>Only Public WTA support, supported<br>functions listing below -<br>* Make a telephone call<br>* Send a string of DTMF tones over<br>an established voice connection<br>* Add an entry to the telephone<br>book of the device |           | Y       |
|          | Supports WML, WCSS, XHTML mp   |           | Y       |
| USB      | Mass Storage Device  |           | Y       |
|          | Virtual COM (PCSync)   |           | Y       |

### 3. TECHNICAL BRIEF

#### 3.1 Digital Main Processor

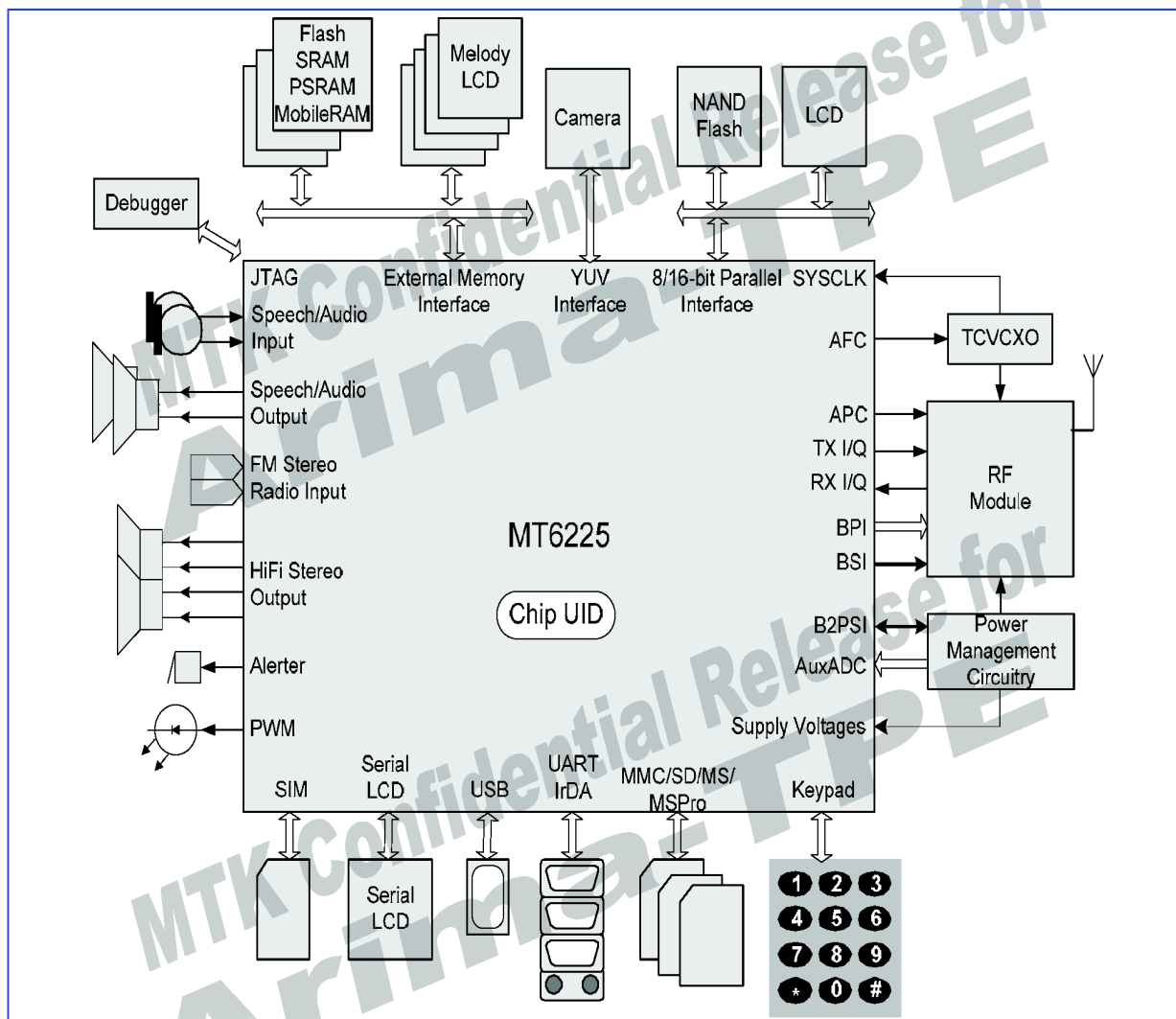


Figure.3-1-1 MT6225 FUNCTIONAL BLOCK DIAGRAM

### **3.1.1 System overview**

The MT6225 is a highly integrated single chip solution for GSM/GPRS phone. Based on 32-bit ARM7EJ-STM RISC processor, MT6225 features not only high performance GPRS Class 12 MODEM but is also designed with support for the wireless multi-media applications, such as advanced display engine, synthesis audio with 64-tone polyphony, digital audio playback, Java acceleration, MMS and etc. Additionally, MT6225 provides varieties of advanced interfaces for functionality extensions, like 3-port external memory interface, 3-port 8/16-bit parallel interface, NAND Flash, IrDA, USB and MMC/SD/MS/MS Pro.

#### **Platform**

MT6225 is capable of running the ARM7EJ-STM RISC processor at up to 104 MHz, thus providing fast data processing capabilities. In addition to the high clock frequency, a separate CODE cache is also added to further improve the overall system efficiency. For large amounts of data transfer, high performance DMA (Direct Memory Access) with hardware flow control is implemented, which greatly enhances the data movement speed while reducing MCU processing load.

#### **External Memory Interface**

To provide the greatest capacity for expansion and maximum bandwidth for data intensive applications such as multimedia features, MT6225 supports up to 3 external state-of-the-art devices through its 16-bit host interface. High performance devices such as Mobile RAM and Cellular RAM are supported for maximum bandwidth. Traditional devices such as burst/page mode flash, page mode SRAM, and Pseudo SRAM are also supported. For greatest compatibility, the memory interface can also be used to connect to legacy devices such as Color/Parallel LCD, and multi-media companion chips are all supported through this interface. To minimize power consumption and ensure low noise, this interface is designed for flexible I/O voltage and allows lowering of the supply voltage down to 1.8V. The driving strength is configurable for signal integrity adjustment. The data bus also employs retention technology to prevent the bus from floating during a turn over.

#### **Multi-media Subsystem**

In order to provide more flexibility and bandwidth for multi-media products, an additional 8/16 bit parallel interface is incorporated. This interface is designed specially for support with Camera companion chip as well as LCD panel. In addition, MT6225 has camera YUV interface that can connect to CMOS sensor of resolution up to VGA. Moreover, it can connect NAND flash device to provide a solution for multi-media data storage. For running multi-media application faster, MT6225 integrates also several hardware-based engines. With hardware based Resizer and advanced display engine, it can display and combine arbitrary size of images with up to 4 blending layers.

#### **User Interface**

For user interactions, the MT6225 brings together all necessary peripheral blocks for multi-media GSM/GPRS phone. It comprises the Keypad Scanner with capability of multiple key pressing, SIM Controller, Alerter, Real Time Clock, PWM, Serial LCD Controller and General Purpose Programmable I/Os. For connectivity and data storage, the MT6225 consists of UART, IrDA, USB 1.1 Slave, SDIO and MMC/SD/MS/MS Pro.

#### **Audio Interface**

Using a highly integrated mixed-signal Audio Front-End, the MT6225 architecture allows for easy audio interfacing with direct connection to the audio transducers. The audio interface integrates D/A and A/D Converters for Voice band, as well as high resolution Stereo D/A Converters for Audio band. In addition, MT6225 also provides Stereo Input and Analog Mux.

MT6225 supports AMR codec to adaptively optimize speech and audio quality. Moreover, HE-AAC codec is implemented to deliver CD-quality audio at low bit rates.

Overall, MT6225's audio features provide a rich platform for multi-media applications.  
MT6225 GSM/GPRS Baseband Processor Data Sheet 1.12

### **Radio Interface**

MT6225 integrates a mixed-signal Baseband front-end in order to provide a well-organized radio interface with flexibility for efficient customization. It contains gain and offset calibration mechanisms, and filters with programmable coefficients for comprehensive compatibility control on RF modules. This approach also allows the usage of a high resolution D/A Converter for controlling VCXO or crystal, thus reducing the need for expensive TCVCXO. MT6225 achieves great MODEM performance by utilizing 14-bit high resolution A/D Converter in the RF downlink path. Furthermore, to reduce the need for extra external current-driving component, the driving strength of some BPI outputs is designed to be configurable.

### **Debug Function**

The JTAG interface enables in-circuit debugging of software program with the ARM7EJ-S core. With this standardized debugger interface, the MT6225 provides developers with a wide set of options for choosing ARM development kits from supports of thirty parties. For security reason, JTAG interface can be disabled by programming internal OTP (one-time programmable) fuse.

### **Power Management**

The MT6225 offers various low-power features to help reduce system power consumption. These features include Pause Mode of 32KHz clocking at Standby State, Power Down Mode for individual peripherals, and Processor Sleep Mode. In addition, MT6225 is also fabricated in advanced low leakage CMOS process, hence providing an overall ultra low leakage solution.

### **Package**

The MT6225 device is offered in a 12mm×12mm, 264-ball, 0.65 mm pitch, TFBGA package.

## **3.1.2 Platform Feature**

### **General**

Integrated voice-band, audio-band and base-band analog front ends  
TFBGA 12mm×12mm, 264-ball, 0.65 mm pitch package

### **MCU Subsystem**

ARM7EJ-S 32-bit RISC processor  
High performance multi-layer AMBA bus  
Java hardware acceleration for fast Java-based games and applets  
ARM7EJ-S Operating frequency: 26/52/104 MHz  
Dedicated DMA bus  
14 DMA channels  
48K Bytes on-chip SRAM  
72K Bytes MCU dedicated Tightly Coupled Memory  
16K Bytes Code cache  
On-chip boot ROM for Factory Flash Programming  
Watchdog timer for system crash recovery  
2 sets of General Purpose Timer  
Circuit Switch Data coprocessor  
Division coprocessor

### **External Memory Interface**

Supports up to 3 external devices  
Supports 16-bit memory components with maximum size of up to 64M Bytes each  
Supports Mobile RAM and Cellular RAM  
Supports Flash and SRAM with Page Mode or Burst Mode  
Supports Pseudo SRAM

Industry standard Parallel LCD Interface  
Supports multi-media companion chips with 8/16 bits data width  
Flexible I/O voltage of 1.8V ~ 2.8V for memory interface  
Configurable driving strength for memory interface

#### **User Interfaces**

6-row × 7-column keypad controller with hardware scanner  
Supports multiple key presses for gaming  
SIM/USIM Controller with hardware T=0/T=1 protocol control  
Real Time Clock (RTC) operating with a separate power supply  
General Purpose I/Os (GPIOs)  
2 Sets of Pulse Width Modulation (PWM) Output  
Alert Output with Enhanced PWM or PDM  
4~10 external interrupt lines

#### **Connectivity**

3 UARTs with hardware flow control and speed up to 921600 bps  
IrDA modulator/demodulator with hardware framer supports SIR mode of operation  
Full-speed USB 1.1 Device controller  
Multi Media Card/Secure Digital Memory Card/Memory Stick/Memory Stick Pro host controller  
Supports SDIO interface for SDIO peripherals as well as WIFI connectivity  
DAI/PCM and I2S interface for Audio application

#### **Security**

Supports security key for code protection  
143-bit unique/secret chip ID

#### **Power Management**

Power Down Mode for analog and digital circuits  
Processor Sleep Mode  
Pause Mode of 32KHz clocking at Standby State  
7-channel Auxiliary 10-bit A/D Converter for charger and battery monitoring and photo sensing

#### **Test and Debug**

Built-in digital and analog loop back modes for both Audio and Baseband Front-End  
DAI port complying with GSM Rec.11.10  
JTAG port for debugging embedded MCU

### **3.1.3 MODEM Features**

#### **Radio Interface and Baseband Front End**

GMSK modulator with analog I and Q channel outputs  
10-bit D/A Converter for uplink baseband I and Q signals  
14-bit high resolution A/D Converter for downlink baseband I and Q signals  
Calibration mechanism of offset and gain mismatch for baseband A/D Converter and D/A Converter  
10-bit D/A Converter for Automatic Power Control  
13-bit high resolution D/A Converter for Automatic Frequency Control  
Programmable Radio RX filter  
2 Channels bi-directional Baseband Serial Interface (BSI) with 3-wire or 4-wire control  
10-Pin Baseband Parallel Interface (BPI) with programmable driving strength  
Multi-band support

#### **Voice and Modem CODEC**

Dial tone generation  
Voice Memo

- Noise Reduction
- Echo Suppression / Echo Cancellation
- Advanced Sidetone Oscillation Reduction
- Digital sidetone generator with programmable gain
- Two programmable acoustic compensation filters
- GSM/GPRS quad vocoders for adaptive multirate (AMR), enhanced full rate (EFR), full rate (FR) and half rate (HR)
- FR error concealment
- GSM channel coding, equalization and A5/1, A5/2 and A5/3 ciphering
- GPRS GEA1, GEA2 and GEA3 ciphering
- Programmable GSM/GPRS Modem
- Packet Switched Data with CS1/CS2/CS3/CS4 coding schemes
- GSM Circuit Switch Data
- GPRS Class 12

#### **Voice Interface and Voice Front End**

- Two microphone inputs sharing one low noise amplifier with programmable gain and automatic gain control (AGC) mechanism
- Voice power amplifier with programmable gain
- 2nd order Sigma-Delta A/D Converter for voice uplink path
- D/A Converter for voice downlink path
- Supports half-duplex hands-free operation
- Compliant with GSM 03.50

### **3.1.4 Multi-Media Features**

#### **LCD/NAND Flash Interface**

- 18-bit Parallel Interface supports 8/16 bit NAND flash and 8/9/16/18 bit Parallel LCD
- 8/16 bit NAND Flash Controller with 1-bit ECC correction for mass storages
- 2 Chip selects available for high-density NAND flash device
- Serial LCD Interface with 8/9 bit format support

#### **LCD Controller**

- Hardware accelerated display
- Supports simultaneous connection to up to 2 parallel LCD and 1 serial LCD modules
- Supports format: RGB332, RGB444, RGB565, RGB666, RGB888
- Supports LCD panel maximum resolution up to 800x600 at 16bpp
- Supports hardware display rotation
- Capable of combining display memories with up to 4 blending layers
- Accelerated Gamma correction with programmable gamma table.

#### **Image Signal Processor**

- 8 bit YUV format image input
- Capable of processing image of size up to VGA
- Flexible I/O voltage of 1.8V ~ 2.8V

#### **Audio CODEC**

- Wavetable synthesis with up to 64 tones
- Advanced stereo wavetable synthesizer
- Wavetable including GM full set of 128 instruments and 47 sets of percussions
- PCM Playback and Record
- Digital Audio Playback
- HE-AAC decode support

#### **Audio Interface and Audio Front End**

- Supports I2S interface



High resolution D/A Converters for Stereo Audio playback  
Stereo analog input for stereo audio source  
Analog multiplexer for Stereo Audio  
Stereo to Mono Conversion  
FM radio recording

### **3.1.5 General Description**

Figure 3-1-2 details the block diagram of MT6225. Based on dual-processor architecture, the major processor of MT6225 is ARM7EJ-S, which mainly runs high-level GSM/GPRS protocol software as well as multi-media applications. With the other one is a digital signal processor corresponding for handling the low-level MODEM as well as advanced audio functions. Except for some mixed-signal circuitries, the other building blocks in MT6225 are connected to either the microcontroller or the digital signal processor. Specifically, MT6225 consists of the following subsystems:

- Microcontroller Unit (MCU) Subsystem, including an ARM7EJ-S RISC processor and its accompanying memory management and interrupt handling logics.

- Digital Signal Processor (DSP) Subsystem, including a DSP and its accompanying memory, memory controller, and interrupt controller.

- MCU/DSP Interface, where the MCU and the DSP exchange hardware and software information.

- Microcontroller Peripherals, which include all user interface modules and RF control interface modules.

- Microcontroller Coprocessors, which intend to run computing-intensive processes in place of Microcontroller.

- DSP Peripherals, which are hardware accelerators for GSM/GPRS channel codec.

- Multi-media Subsystem, which integrate several advanced accelerators to support multi-media applications.

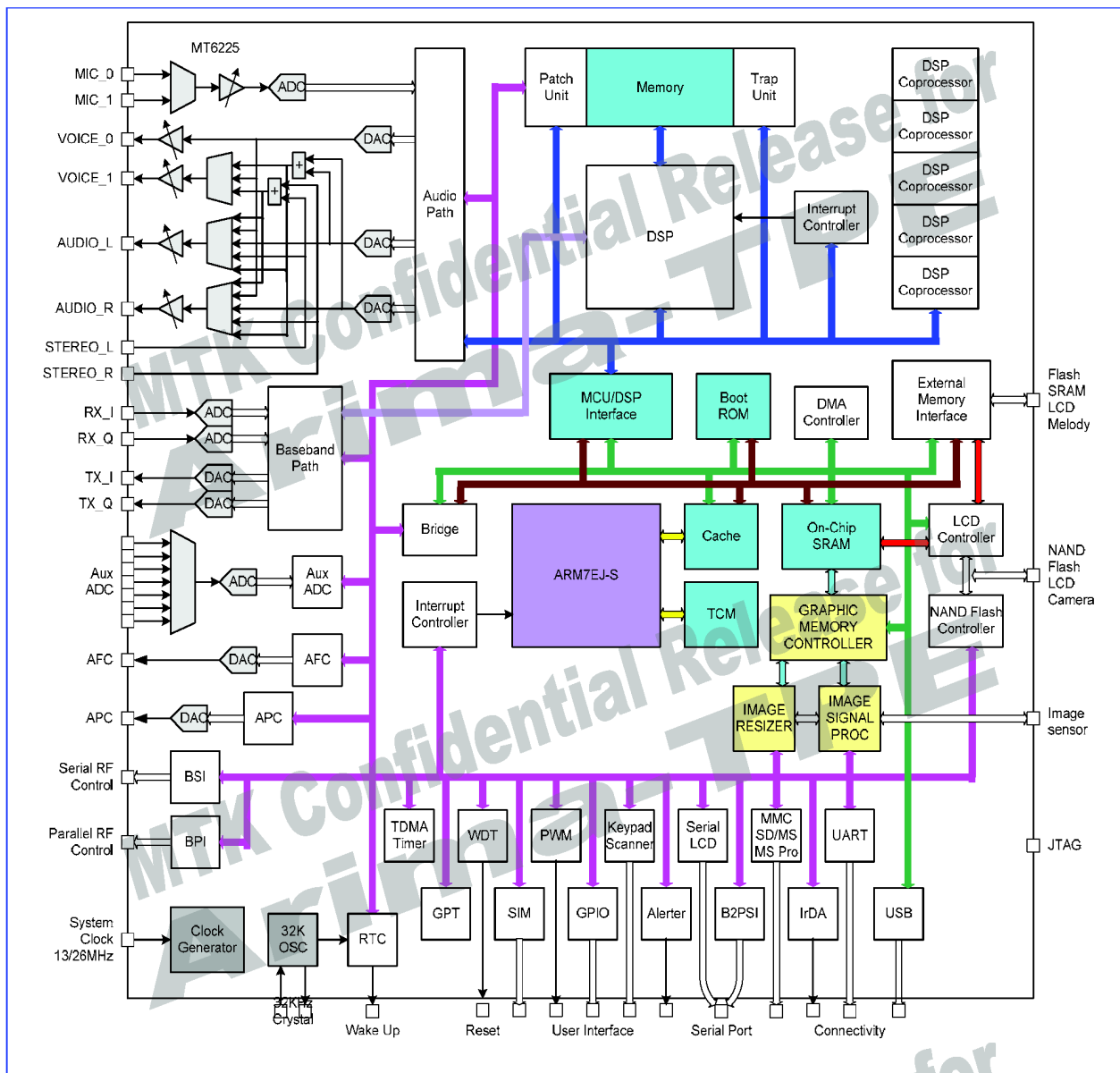
- Voice Front End, the data path of conveying analog speech from and to digital speech.

- Audio Front End, also the data path of conveying stereo audio from stereo audio source

- Baseband Front End, the data path of conveying digital signal from and to analog signal of RF modules.

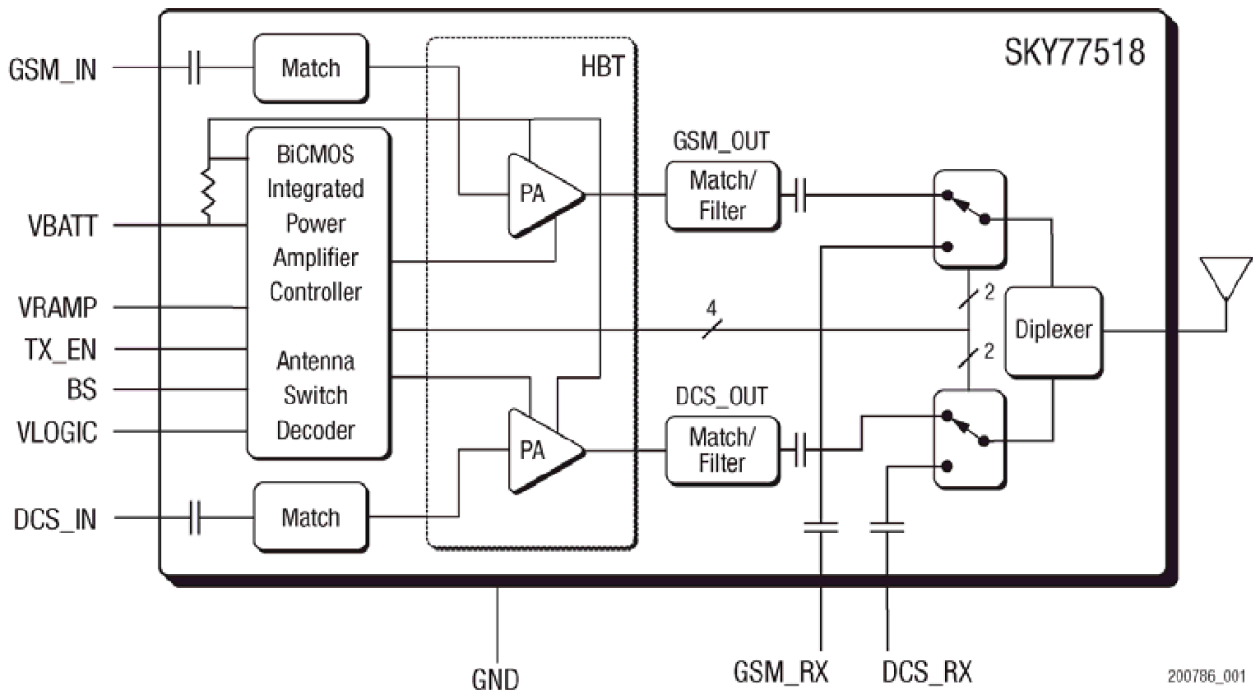
- Timing Generator, generating the control signals related to the TDMA frame timing.

- Power, Reset and Clock subsystem, managing the power, reset and clock distribution inside MT6225.



**Figure.3-1-2 MT6225 BLOCK DIAGRAM**

### 3.2 Power Amplifier Module (SKY77518)



**Figure.3-2-1 SKY77518 FUNCTIONAL BLOCK DIAGRAM**

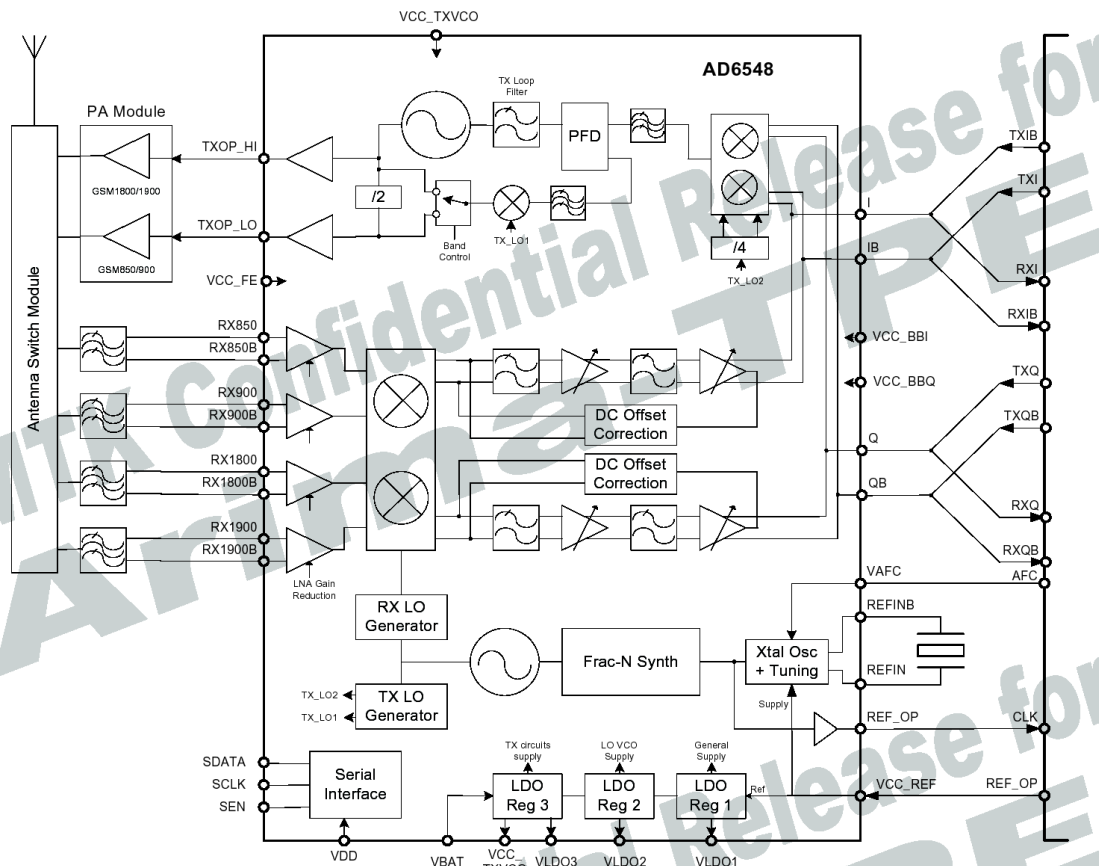
The SKY77518-21 is a transmit and receive front-end module (FEM) with Integrated Power Amplifier Control (iPAC.) for dual-band cellular handsets comprising GSM900 and DCS1800 operation. Designed in a low profile, compact form factor, the SKY77518-21 offers a complete Transmit VCO-to-Antenna and Antenna-to-Receive SAW filter solution. The FEM also supports Class 12 General Packet Radio Service (GPRS) multi-slot operation.

The module consists of a GSM900 PA block and a DCS1800 PA block, impedance-matching circuitry for 50  $\Omega$  input and output impedances, TX harmonics filtering, high linearity and low insertion loss PHEMT RF switches, diplexer and a Power Amplifier Control (PAC) block with internal current sense resistor. A custom BiCMOS integrated circuit provides the internal PAC function and decoder circuitry to control the RF switches. The two Heterojunction Bipolar Transistor (HBT) PA blocks are fabricated onto a single Gallium Arsenide (GaAs) die. One PA block supports the GSM900 band and the other PA block supports the DCS1800 band. Both PA blocks share common power supply pads to distribute current. The output of each PA block and the outputs to the two receive pads are connected to the antenna pad through PHEMT RF switches and a diplexer. The GaAs die, PHEMT die, Silicon (Si) die and passive components are mounted on a multi-layer laminate substrate. The assembly is encapsulated with plastic overmold.

Band selection and control of transmit and receive modes are performed using two external control pads. The band select pad (BS) selects between GSM and DCS modes of operation. The transmit enable (TX\_EN) pad controls receive or transmit mode of the respective RF switch (TX = logic 1). Proper timing between transmit enable (TX\_EN) and Analog Power Control (VRAMP) allows for high isolation between the antenna and TXVCO while the VCO is being tuned prior to the transmit burst.

The SKY77518-21 is compatible with logic levels from 1.2 V to VCC for BS and TX\_EN pads, depending on the level applied to the VLOGIC pad. This feature provides additional flexibility for the designer in the selection of FEM interface control logic.

### 3.3 Transceiver Module (AD6548)



**Figure.3-3-1 AD6548 FUNCTIONAL BLOCK DIAGRAM**

#### 3.3.1 General Descriptions

The AD6548/9 provides a highly integrated direct conversion radio solution that combines, on a single chip, all radio and power management functions necessary to build the most compact GSM radio solution possible. The only external components required for a complete radio design are the Rx SAWs, PA, Switchplexer and a few passives enabling an extremely small cost effective GSM Radio solution.

The AD6548/9 uses the industry proven direct conversion receiver architecture of the Othello™ family. For Quad band applications the front end features four fully integrated programmable gain differential LNAs. The RF is then downconverted by quadrature mixers and then fed to the baseband programmable-gain amplifiers and active filters for channel selection. The Receiver output pins can be directly connected to the baseband analog processor. The Receive path features automatic calibration and tracking to remove DC offsets.

The transmitter features a translation-loop architecture for directly modulating baseband signals onto the integrated TX VCO. The translation-loop modulator and TX VCO are extremely low noise removing the need for external SAW filters prior to the PA.

The AD6548/9 uses a single integrated LO VCO for both the receive and the transmit circuits. The synthesizer lock times are optimized for GPRS applications up to and including class 12. To dramatically reduce the BOM both TX Translational loop and main PLL Loop Filters are fully integrated into the device.

AD6548 incorporates a complete reference crystal calibration system. This allows the external VCTCXO to be replaced with a low cost crystal. No other external components are required. The AD6549 uses the traditional VCTCXO reference source.

The AD6548/9 also contains on-chip low dropout voltage regulators (LDOs) to deliver regulated

supply voltages to the functions on chip, with a battery input voltage of between 2.9V and 5.5V. Comprehensive power down options are included to minimize power consumption in normal use.

A standard 3 wire serial interface is used to program the IC. The interface features low-voltage digital interface buffers compatible with logic levels from 1.6V to 3.0V.

The AD6548/9 is packaged in a 5mm × 5mm , 32-lead LFCSP package.

| 3.3.2 | ORDERING GUIDE | Model Temperature Range | Package  |
|-------|----------------|-------------------------|----------|
|       | AD6548BCPZ     | -20 °C to +85 °C        | LFCSP-32 |
|       | AD6549BCPZ     | -20 °C to +85 °C        | LFCSP-32 |

## Features

Fully Integrated GSM Transceiver including

### Direct Conversion Receiver

4 Differential LNAs

Integrated Active RX Channel Select Filters

Programmable Gain Baseband Amplifiers

### Translation Loop Direct VCO Modulator

Integrated TX VCO and tank

External TX filters eliminated

Integrated Loop filter components

### High performance multi band PLL system

Fast Fractional-N Synthesizer

Integrated Local Oscillator VCO

Fully Integrated Loop filters

Crystal Reference Oscillator & Tuning System (AD6548)

### Power Management

Integrated LDOs allow direct battery supply connection

### Small footprint

32-Lead 5 X 5 mm Chipscale Package

### APPLICATIONS

Dual, Triple and Quad Band Radios

- GSM850, E-GSM 900, DCS1800 and PCS1900

- GPRS to Class 12- EDGE RX

## 3.3.3 Pin Descriptions

| No | Name      | Description                                  | No | Name    | Description  |
|----|-----------|--|----|---------|--|
| 1  | VCC_FE    | Front end supply (IP) <sup>3</sup>           | 17 | VCC_REF | Reference Oscillator Supply (IP)                               |
| 2  | I         | I baseband input/output                      | 18 | VAFC    | AD6548 Crystal Freq control (IP)<br>AD6549: Connect to VCC_REF |
| 3  | IB        | I baseband input/output                      | 19 | REFINB  | Crystal / VCTCXO Connection                                    |
| 4  | VCC_BBI   | Baseband I, TX path supply (IP) <sup>3</sup> | 20 | REFIN   | Crystal Connection   |
| 5  | SDATA     | Serial port data                             | 21 | REF_OP  | Reference Frequency Output                                     |
| 6  | SCLK      | Serial port clock                            | 22 | QB      | Q baseband input/output  |
| 7  | SEN       | Serial port enable                           | 23 | Q       | Q baseband input/output  |
| 8  | N/C       | Not connected                                | 24 | VCC_BBQ | Baseband Q supply (IP) <sup>3</sup>                            |
| 9  | VLDO3     | TX LDO Output <sup>1</sup>                   | 25 | RX1900B | PCS 1900 LNA input   |
| 10 | TXOP_LO   | Transmit O/P (850/900MHz)                    | 26 | RX1900  | PCS 1900 LNA input   |
| 11 | TXOP_HI   | Transmit O/P (1800/1900MHz)                  | 27 | RX1800B | DCS 1800 LNA input   |
| 12 | VCC_TXVCO | TX VCO supply (1)                            | 28 | RX1800  | DCS 1800 LNA input   |
| 13 | VDD       | Serial interface supply                      | 29 | RX900B  | E-GSM 900 LNA input  |
| 14 | VBAT      | Battery I/P for LDO reg's                    | 30 | RX900   | E-GSM 900 LNA input  |
| 15 | VLDO1     | LDO regulator Output <sup>2</sup>            | 31 | RX850B  | GSM 850 LNA input  |
| 16 | VLDO2     | LO VCO Supply <sup>1</sup>                   | 32 | RX850   | GSM 850 LNA input  |

### 3.4 PMIC (MT6318)

Power management is one of the most important functions in this PMIC. The power management function applies proper management procedures and control functions to the mobile handset's battery, charger, and power supply. More specifically, the management criterion is to provide power to the mobile phone while extending the standby/active time as long as possible.

The block diagram implemented in PMIC is shown further below to describe the relationships between different states.

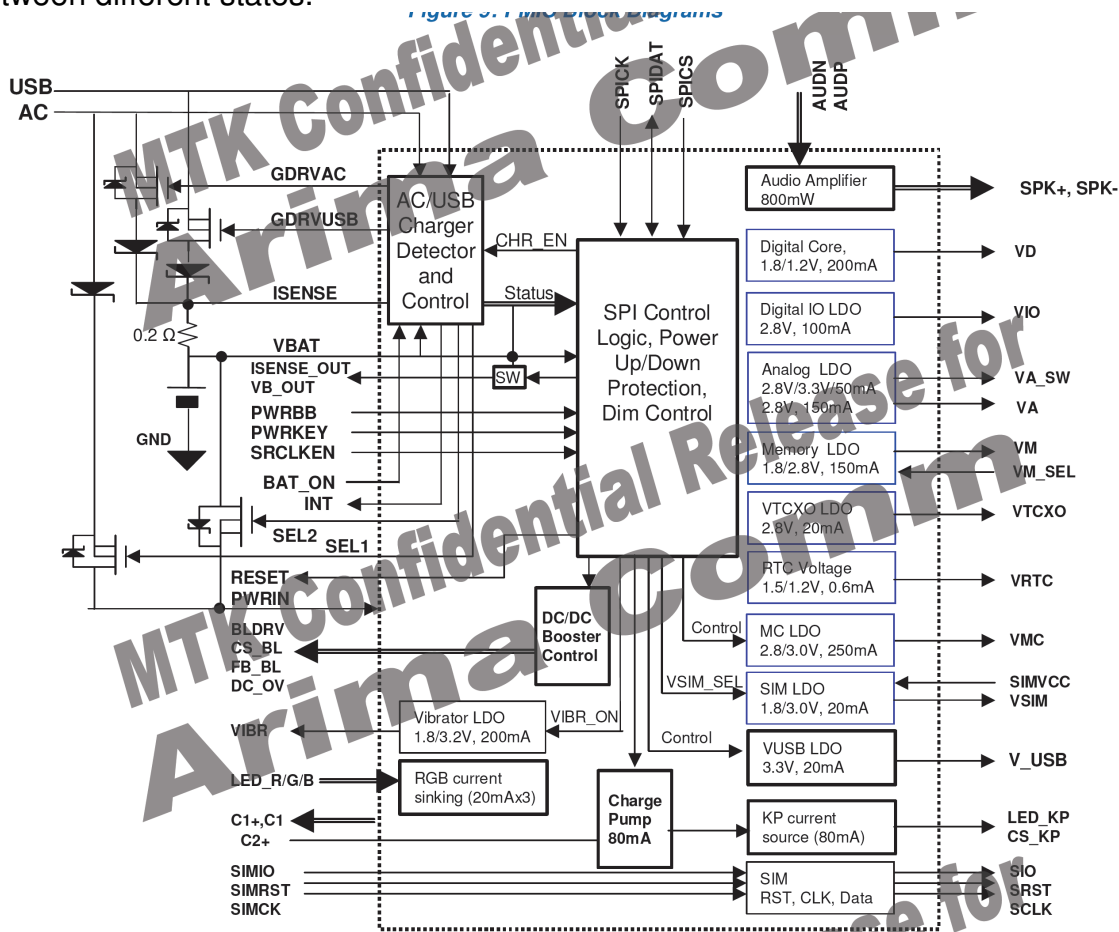


Figure.3-4-1 MT6318 FUNCTIONAL BLOCK DIAGRAM

### 3.4.1 Features

Handles all GSM/GPRS Baseband Power Management  
Input range: 2.8 V ~ 5.0 V  
Charger input of up to 15 V  
11 LDOs optimized for specific GSM/GPRS subsystems  
2-step RTC LDO  
600 mW Class AB audio amplifier  
Booster for series backlight LED driver  
Charge pump for parallel backlight LED driver  
SPI interface  
Pre-charge indication  
Li-ion battery charge function  
SIM card interface  
RGB LED driver  
Vcore for power-saver mode  
Over-current and thermal overload protection  
Programmable under voltage lockout protection  
Power-on reset and start-up timer  
96-pin TFBGA package

### 3.4.2 Applications

GSM/GPRS mobile handsets, basic phones and high-end phones.

### 3.4.3 General Description

The MT6318 is a power management system chip optimized for GSM/GPRS handsets, especially those based on the MediaTek MT621x/MT622x system solution. MT6318 contains 11 LDOs, one to power each of the critical GSM/GPRS sub-blocks. Sophisticated controls are available for power-up during battery charging, for the keypad interface, and for the RTC alarm. The MT6318 is optimized for maximum battery life.

The 2-step RTC LDO design allows the RTC circuit to stay alive without a battery for several hours.

The MT6318 battery charger can be used with a lithium-ion (Li+) battery.

The SIM interface provides the level shift between SIM card and microprocessor.

The MT6318 is available in a 96-pin TFBGA package.

The operating temperature range is -25°C to +85°C.

### 3.4.4 Ordering Information

| ORDER # | MARKING    | TEMP. RANGE    | PACKAGE     |
|---------|------------|----------------|-------------|
| MT6318A | MT6318A/AY | -25°C to +85°C | TFBGA - 96L |

3.5 Memory Module (PF38F4050M0Y0CG)

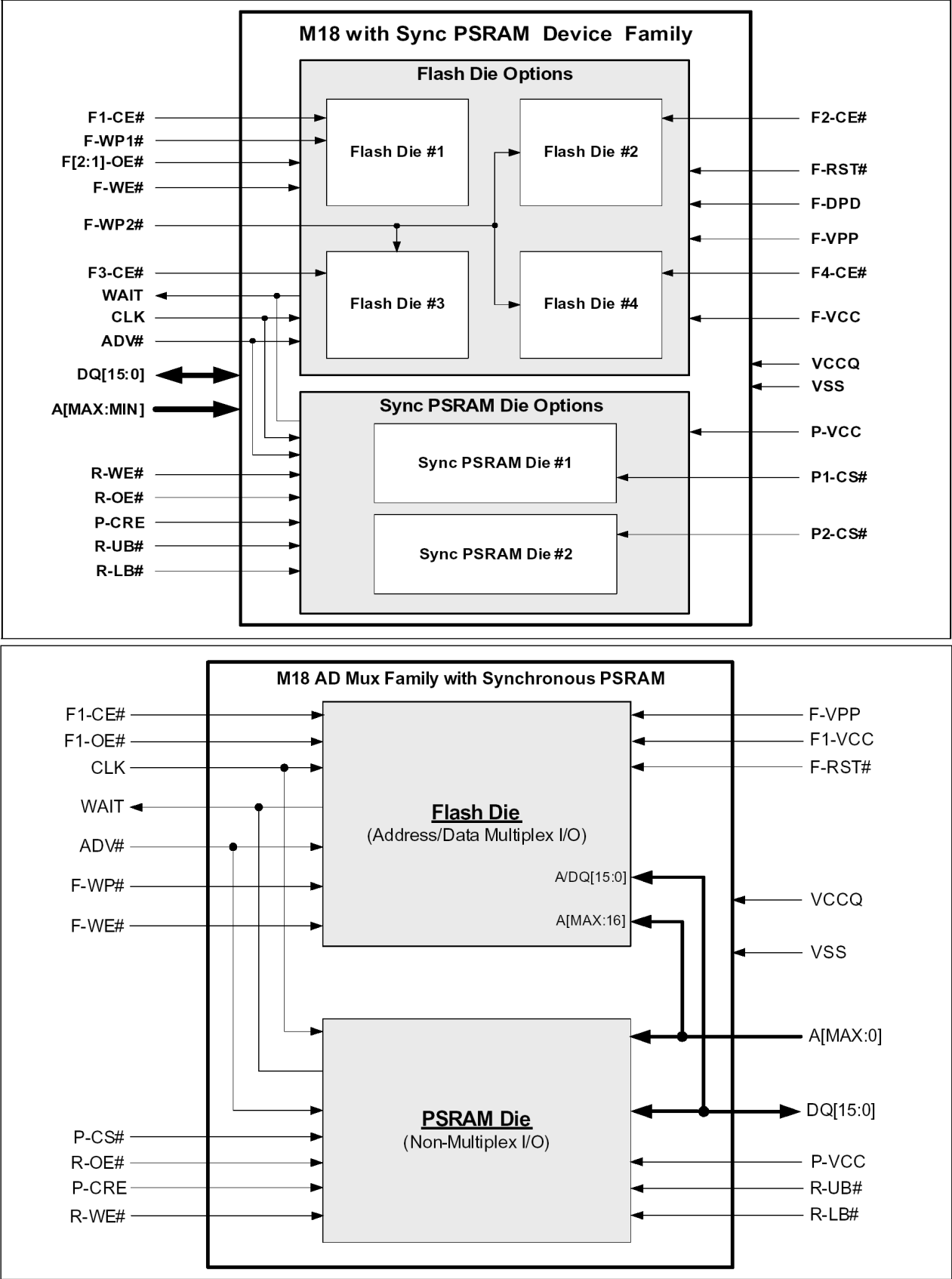


Figure.3-5-1 PF38F4050M0Y0CG FUNCTIONAL BLOCK DIAGRAM



The M18 family with synchronous PSRAM stacked product family encompasses multiple M18 flash memory plus synchronous PSRAM die combinations and I/O interface options. M18 is available as a Non-Multiplex or Address-Data Multiplex (AD-Mux) I/O interface option, while the synchronous PSRAM is available only as a Non-Multiplex I/O interface.

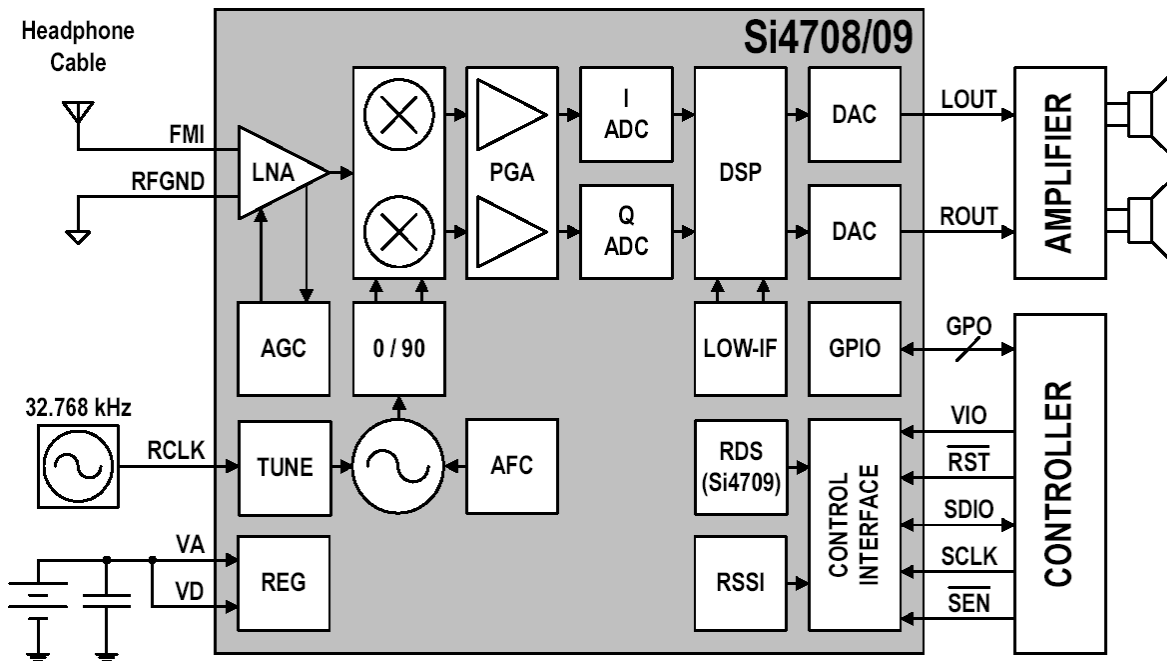
The M18 is the latest generation of Numonyx™ StrataFlash® memory with highlighted features like symmetrical block array, configurable burst lengths, automated device blank check, security using OTP and zero-latency block lock. The M18 delivers up to 133 MHz synchronous burst and page-mode read rates with multi-partitioning Read-While- Program and Read-While-Erase operations. The synchronous PSRAM (Non-Mux I/O interface) is a high-performance volatile memory operating at speeds up to 104 MHz with configurable burst lengths. The PSRAM lower sixteen addresses can be routed to the data pins on the PCB board to enable a flexible flash and PSRAM AD-Mux I/O interface device design. This stacked device family features configurable output driver strength and 1.8 volt low-voltage operation in an Numonyx™ Flash memory x16C or QUAD+ standard footprint and signal ball outs.

| Symbol                                   | Type           | Signal Descriptions   | Notes |
|--|----------------|---|-------|
| <b>Address and Data Signals, Non-Mux</b> |                |   |       |
| A[MAX:0]                                 | Input          | <b>ADDRESS:</b> Global device signals.<br>Shared address inputs for all memory die during read and write operations. <ul style="list-style-type: none"> <li>1 Gbit: AMAX = A25</li> <li>512 Mbit: AMAX = A24</li> <li>256 Mbit: AMAX = A23</li> <li>128 Mbit: AMAX = A22</li> <li>64 Mbit: AMAX = A21</li> <li>32 Mbit: AMAX = A20</li> <li>A0 is the lowest-order word address.</li> <li>Unused address inputs should be treated as RFU.</li> </ul>  | 1     |
| DQ[15:0]                                 | Input / Output | <b>DATA INPUT/OUTPUTS:</b> Global device signals.<br>Inputs data and commands during write cycles, outputs data during Read cycles. Data signals are High-Z when the device is deselected or its output is disabled.  | –     |
| <b>Address and Data Signals, AD-Mux</b>  |                |   |       |
| DQ[15:0]                                 | Input / Output | <b>ADDRESS-DATA MULTIPLEXED INPUTS/OUTPUTS:</b> AD-Mux I/O flash signals.<br>During AD-Mux read cycles, DQ[15:0] are used to input the lower address followed by read-data output. During AD-Mux write cycles, DQ[15:0] are used to input the lower address followed by commands or data. <ul style="list-style-type: none"> <li>DQ[15:0] are High-Z when the device is deselected or its output is disabled.</li> <li>DQ[15:0] is only used with AD-Mux I/O flash device.</li> </ul> <b>Note:</b> A[MAX:16] can be treated as a NC pins, but the C <sub>L</sub> will exist on the pins.  | 1     |
| <b>Control Signals</b>                   |                |   |       |
| ADV#                                     | Input          | <b>ADDRESS VALID:</b> Flash- and Synchronous PSRAM-specific signal; low-true input.<br>During a synchronous read operation, the address is latched on the rising edge of ADV# or on the next valid CLK edge with ADV# low, whichever occurs first. <ul style="list-style-type: none"> <li>In an asynchronous flash read operation, the address is latched on the rising edge of ADV#, or continuously flows through while ADV# is low.</li> <li>During a synchronous flash Read operation, the address is latched on the rising edge of ADV# or the first active CLK edge whichever occurs first.</li> <li>During synchronous PSRAM read and synchronous write modes, the address is either latched on the first rising clock edge after ADV# assertion or on the rising edge of ADV# whichever edge occurs first. In asynchronous read and asynchronous write modes, ADV# can be used to latch the address, or held low for the entire operation.</li> </ul> <b>Notes:</b> <ol style="list-style-type: none"> <li>During AD-Mux I/O operation, ADV# must remain deasserted during data phase.</li> <li>For 133MHz-capable M18 device synchronous read operation, the address is latched on the next valid CLK edge with ADV# low.</li> </ol> | –     |
| F[4:1]-CE#                               | Input          | <b>FLASH CHIP ENABLE:</b> Flash-specific signal; low-true input.<br>When low, F-CE# selects the associated flash memory die. When high, F-CE# deselects the associated flash die. Flash die power is reduced to standby levels, and its data and WAIT outputs are placed in a High-Z state. <ul style="list-style-type: none"> <li>F1-CE# is dedicated to flash die #1.</li> <li>F[4:2]-CE# are dedicated to flash die #4 through #2, respectively, if present. Otherwise, any unused flash chip enable should be treated as RFU.</li> <li>QUAD+ ballout only support F[3:1]-CE#. Hence F4-CE# signal can be ignored.</li> <li>If NAND is present, F1-CE# selects NOR die #1, F2-CE# selects NOR die #2 while F4-CE# selects NAND die #1 and NAND die #2 using virtual chip-select scheme, F3-CE# selects NAND die #3 if present.</li> </ul>  | –     |
| CLK                                      | Input          | <b>CLOCK:</b> Flash- and Synchronous PSRAM-specific input signal.<br>CLK synchronizes the flash and/or synchronous PSRAM with the system clock during synchronous operations.   | –     |

| Symbol            | Type   | Signal Descriptions   | Notes |
|-------------------|--------|---|-------|
| F[2:1]-OE#        | Input  | <b>FLASH OUTPUT ENABLE:</b> Flash-specific signal; low-true input.<br>When low, F-OE# enables the output drivers of the selected flash die. When high, F-OE# disables the output drivers of the selected flash die and places the output drivers in High-Z. <ul style="list-style-type: none"> <li>F2-OE# is common to all other flash dies, if present. Otherwise, it is an RFU. However, it is highly recommended to always tie F1-OE# and F2-OE# together on the PCB.</li> </ul>   | –     |
| R-OE#             | Input  | <b>RAM OUTPUT ENABLE:</b> PSRAM- and SRAM-specific signal; low-true input.<br>When low, R-OE# enables the output drivers of the selected memory die. When high, R-OE# disables the output drivers of the selected memory die and places the output drivers in High-Z if present. Otherwise it is an RFU.  | 3     |
| F-RST#            | Input  | <b>FLASH RESET:</b> Flash-specific signal; low-true input.<br>When low, F-RST# resets internal operations and inhibits writes. When high, F-RST# enables normal operation.  | –     |
| WAIT              | Output | <b>WAIT:</b> Flash- and Synchronous PSRAM-specific signal; configurable true-level output.<br>When asserted, WAIT indicates invalid output data. When deasserted, WAIT indicates valid output data. <ul style="list-style-type: none"> <li>WAIT is driven whenever the flash or the synchronous PSRAM is selected and its output enable is low.</li> <li>WAIT is High-Z whenever flash or the synchronous PSRAM is deselected, or its output enable is high.</li> <li>Flash and PSRAM must configure the WAIT RCR bit to be the same true-level state.</li> </ul>   | –     |
| F-WE#             | Input  | <b>FLASH WRITE ENABLE:</b> Flash-specific signal; low-true input.<br>When low, F-WE# enables Write operations for the enabled flash die. Address and data are latched on the rising edge of F-WE#.  | –     |
| R-WE#             | Input  | <b>RAM WRITE ENABLE:</b> PSRAM- and SRAM-specific signal; low-true input.<br>When low, R-WE# enables Write operations for the selected memory die. Data is latched on the rising edge of R-WE# if present. Otherwise it is an RFU.  | 3     |
| F-WP1#,<br>F-WP2# | Input  | <b>FLASH WRITE PROTECT:</b> Flash-specific signals; low-true inputs.<br>When low, F-WP# enables the Lock-Down mechanism. When high, F-WP# overrides the Lock-Down function, enabling locked-down blocks to be unlocked with the Unlock command. <ul style="list-style-type: none"> <li>F-WP1# is dedicated to flash die #1.</li> <li>F-WP2# is common to all other flash dies, if present. Otherwise it is an RFU.</li> <li>QUAD+ ballout does not support F-WP2# signal, hence can be ignore.</li> <li>If NAND is present, then all F-WP1# is dedicated to all NOR dies and F-WP2# is dedicated to all NAND dies.</li> </ul> | –     |
| P-CRE             | Input  | <b>PSRAM CONFIGURATION REGISTER ENABLE:</b> Synchronous PSRAM-specific signal; high-true input.<br>When high, P-CRE enables access to the PSRAM Refresh Configuration Register (P-RCR) or Bus Control Register (P-BCR). When low, P-CRE enables normal Read or Write operations if present. Otherwise it is an RFU.   | 2     |
| P-MODE#           | Input  | <b>PSRAM MODE#:</b> Asynchronous only PSRAM-specific signal; low-true input.<br>When low, P-MODE# enables access to the PSRAM Configuration Register, and to enter or exit Low-Power mode. When high, P-MODE# enables normal Read or Write operations if present. Otherwise it is an RFU.   | 2     |
| P[2:1]-CS#        | Input  | <b>PSRAM CHIP SELECT:</b> PSRAM-specific signal; low-true input.<br>When low, P-CS# selects the associated PSRAM memory die. When high, P-CS# deselects the associated PSRAM die. PSRAM die power is reduced to standby levels, and its data and WAIT outputs are placed in a High-Z state. <ul style="list-style-type: none"> <li>P1-CS# is dedicated to PSRAM die #1 if present. Otherwise it is an RFU.</li> <li>P2-CS# is dedicated to PSRAM die #2 if present. Otherwise it is an RFU.</li> </ul>  | 3     |
| S-CS1#<br>S-CS2   | Input  | <b>SRAM CHIP SELECTS:</b> SRAM-specific signals; S-CS1# low-true input, S-CS2 high-true input.<br>When both S-CS1# and S-CS2 are asserted, the SRAM die is selected. When either S-CS1# or S-CS2 is deasserted, the SRAM die is deselected. <ul style="list-style-type: none"> <li>S-CS1# and S-CS2 are dedicated to SRAM if present. Otherwise it is an RFU.</li> </ul>  | 3     |

| Symbol               | Type   | Signal Descriptions  | Notes |
|----------------------|--------|--|-------|
| R-UB#<br>R-LB#       | Input  | <b>RAM UPPER/LOWER BYTE ENABLES:</b> PSRAM- and SRAM-specific signals; low-true inputs.<br>When low, R-UB# enables DQ[15:8] and R-LB# enables DQ[7:0] during PSRAM or SRAM Read and Write cycles. When high, R-UB# masks DQ[15:8] and R-LB# masks DQ[7:0] if present. Otherwise it is an RFU.  | 3     |
| F-DPD                | Input  | <b>FLASH DEEP POWER-DOWN:</b> Flash-specific signal; configurable true-level input.<br>When enabled, F-DPD is used to enter and exit Deep Power-Down mode. When not enabled, F-DPD is ignored. <ul style="list-style-type: none"> <li>F-DPD is common to all other flash dies. Otherwise it is RFU.</li> <li>The QUAD+ ballout does not support F-DPD signal. The M18 DPD RCR setting must be left at its default low-true value.</li> </ul>       | –     |
| N-CLE                | Input  | <b>NAND COMMAND LATCH ENABLE:</b> NAND-specific signal; high-true input.<br>When high, N-CLE enables commands to be latched on the rising edge of F-WE#. <ul style="list-style-type: none"> <li>N-CLE is common to all other NAND dies if present. Otherwise it is RFU.</li> <li>The QUAD+ ballout does not support N-CLE signal, hence can be ignored.</li> </ul>   | 3     |
| N-ALE                | Input  | <b>NAND ADDRESS LATCH ENABLE:</b> NAND-specific signal; high-true input.<br>When high, N-ALE enables addresses to be latched on the rising edge of F-WE#. <ul style="list-style-type: none"> <li>N-ALE is common to all other NAND dies if present. Otherwise it is RFU.</li> <li>The QUAD+ ballout does not support N-ALE signal, hence can be ignored.</li> </ul>  | 3     |
| N-RY/BY#             | Output | <b>NAND READY/BUSY:</b> NAND-specific signal; high-true/low-true output.<br>When low, N-RY/BY# indicates the NAND is busy performing a read, program, or erase operations. When high, N-RY/BY# indicates the NAND device is ready. <ul style="list-style-type: none"> <li>N-RY/BY# is common to all other NAND dies if present. Otherwise it is RFU.</li> <li>The QUAD+ ballout does not support N-RY/BY# signal, hence can be ignored.</li> </ul> | 3     |
| <b>Power Signals</b> |        |  |       |
| F-VPP                | Power  | <b>FLASH PROGRAM/ERASE VOLTAGE:</b> Flash specific.<br>F-VPP supplies program or erase power to the flash die.   | –     |
| F[2:1]-VCC           | Power  | <b>FLASH CORE POWER SUPPLY:</b> Flash specific. <ul style="list-style-type: none"> <li>F[2:1]-VCC supplies the core power to the flash dies.</li> <li>F2-VCC is recommended to be tied to F1-VCC, else it is an RFU.</li> <li>If NAND is present, F1-VCC is dedicated to supply the core power to all NOR dies, and F2-VCC is dedicated to supply the core power to all NAND dies.</li> </ul>  | –     |
| VCCQ                 | Power  | <b>I/O POWER SUPPLY:</b> Global device I/O power.<br>VCCQ supplies the device input/output driver voltage.   | –     |
| P-VCC                | Power  | <b>PSRAM CORE POWER SUPPLY:</b> PSRAM specific.<br>P-VCC supplies the core power to the PSRAM die if present. Otherwise it is an RFU.  | 3     |
| S-VCC                | Power  | <b>SRAM POWER SUPPLY:</b> SRAM specific.<br>S-VCC supplies the core power to the SRAM die if present. Otherwise it is an RFU.  | 3     |
| VSS                  | Ground | <b>DEVICE GROUND:</b> Global ground reference for all signals and power supplies.<br>Connect all VSS balls to system ground. Do not float any VSS connections.   | –     |
| DU                   | —      | <b>DO NOT USE:</b><br>Ball should not be connected to any power supplies, signals, or other balls; Can be left floating.   | –     |
| RFU                  | —      | <b>RESERVED for FUTURE USE:</b><br>Reserved by Numonyx for future device functionality/enhancement. Ball must be left floating.  | –     |

### 3.6 FM Radio Module (Si4708)



**Figure. 3-6-1 Si4708 FM Receiver Block Diagram**

The Si4708/09 extends Silicon Laboratories Si4700 FM tuner family, and further increases the ease and attractiveness of adding FM radio reception to mobile devices through small size and board area, minimum component count, flexible programmability, and superior, proven performance. Si4708/09 software is backwards compatible to existing Si4700/01/02/03 FM Tuner designs and leverages Silicon Laboratories' highly successful and patented Si4700/01/02/03 FM tuner. The Si4708/09 benefits from proven digital integration and 100% CMOS process technology, resulting in a completely integrated solution. It is the industry's smallest footprint FM tuner IC requiring only 6.25 mm<sup>2</sup> board space and one external bypass capacitor.

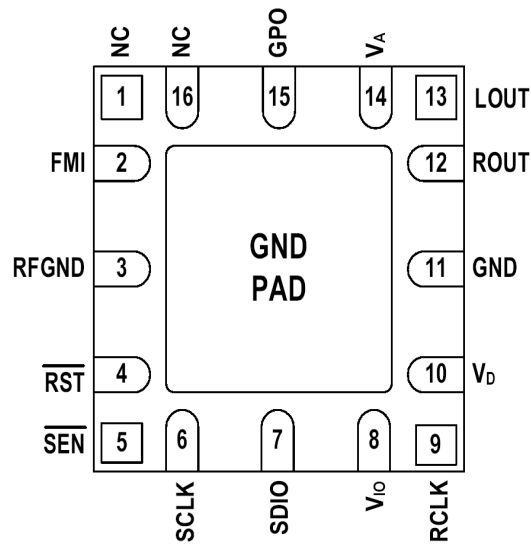
The device offers significant programmability, catering to the subjective nature of FM listeners' audio preferences and variable FM broadcast environments worldwide.

The Si4709 incorporates a digital processor for the European Radio Data System (RDS) and the US Radio Broadcast Data System (RBDS) including all required symbol decoding, block synchronization, error detection, and error correction functions.

RDS/RBDS\* enables data such as station identification and song name to be displayed to the user. The Si4709 offers a detailed RDS view and a standard view, allowing adopters to selectively choose granularity of software is backwards compatible to the proven Si4701/03, adopted by leading cell-phone and MP3 manufacturers world-wide.

The Si4708/09 is based on the superior, proven performance of Silicon Laboratories' Aero architecture offering unmatched interference rejection and leading sensitivity. The device uses the same programming interface as the Si4700/01/02/03 and supports multiple bus modes. Power management is simplified with an integrated regulator allowing direct connection to a 2.7 to 5.5 V battery for VD and 2.7 to 5.5 V battery for VA.

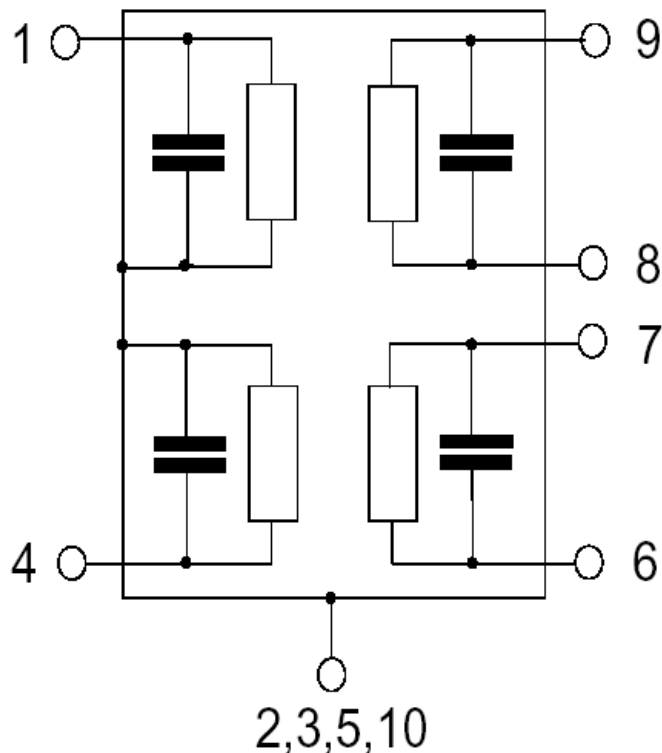
The Si4708/09 device's high level of integration and complete FM system production testing increases quality to manufacturers, improves device yields, and simplifies device manufacturing and final testing.



Top View

| Pin Number(s) | Name                    | Description   |
|---------------|-------------------------|---|
| 1, 16         | NC                      | No Connect. Leave floating.                                   |
| 2             | FMI                     | FM RF inputs.   |
| 3             | RFGND                   | RF ground. Connect to ground plane on PCB.                    |
| 4             | $\overline{\text{RST}}$ | Device reset input (active low).                              |
| 5             | $\overline{\text{SEN}}$ | Serial enable input (active low).                             |
| 6             | SCLK                    | Serial clock input.   |
| 7             | SDIO                    | Serial data input/output.                                     |
| 8             | V <sub>IO</sub>         | I/O supply voltage.   |
| 9             | RCLK                    | External reference oscillator input.                          |
| 10            | V <sub>D</sub>          | Digital supply voltage. May be connected directly to battery. |
| 11, PAD       | GND                     | Ground. Connect to ground plane on PCB.                       |
| 12            | ROUT                    | Right audio output.   |
| 13            | LOUT                    | Left audio output.  |
| 14            | V <sub>A</sub>          | Analog supply voltage. May be connected directly to battery.  |
| 15            | GPO                     | General purpose input/output.                                 |

### 3.7 Antenna Switch Module (B9308)



#### Application

Low-loss 2in1 RF filter for mobile telephone GSM 900 and GSM 1800 systems, receive path (Rx)

Usable passband:

Filter 1 (GSM 1800): 75 MHz

Filter 2 (GSM 900): 35 MHz

Unbalanced to balanced operation for both filters

Very low insertion attenuation

Low amplitude ripple

Impedance transformation from 50 W to 150 W for both filters

Suitable for GPRS class 1 to 12

#### Pin configuration

1 Input [Filter 1]

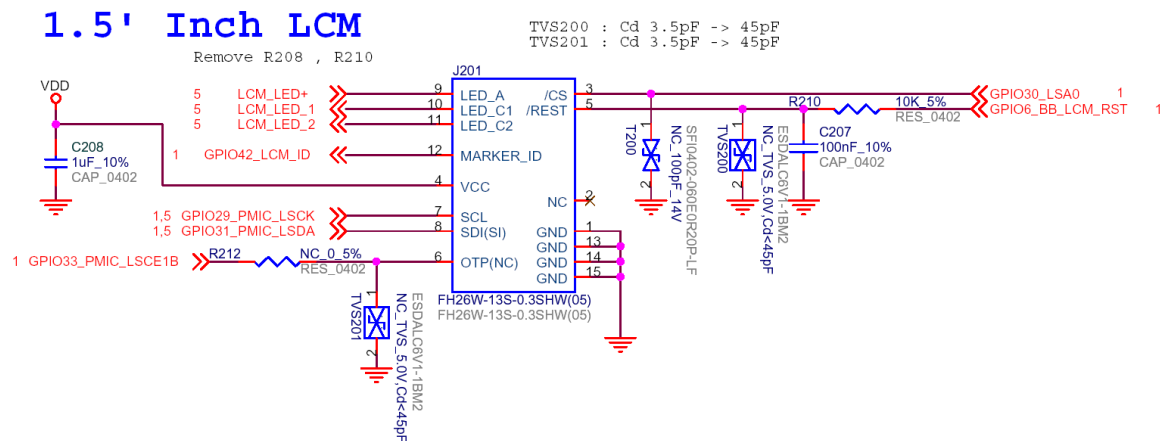
4 Input [Filter 2]

6,7 Output, balanced [Filter 2]

8,9 Output, balanced [Filter 1]

2,3,5,10 Case-ground

## 3.8 LCD Interface



**Figure.3-8-1 LCD Interface**

The **IM152FBN5A** model is a Color TFT (Main) LCD supplied by LG Innotek.

This main LCD has a 1.52 inch diagonally measured active display area with 128(RGB)X128 resolution. Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

Main LCD color is determined with 262,144 colors signal for each pixel.

The **IM152FBN5A** has been designed to apply the interface method that enables low power, high speed, and high contrast.

The **IM152FBN5A** is intended to support applications where thin thickness, wide viewing angle and low power consumption are critical factors and graphic displays are important.

### Pin Description

| Pin No. | Symbol         | Description | Remark  |
|---------|----------------|-------------|---|
| 1       | GND            | -           | Ground  |
| 2       | VSYNC_OUT      | I/O         | FLM   |
| 3       | CS/            | -           | Chip Select. Active low                             |
| 4       | VCC            | I           | Power Supply for internal analog regulator circuits |
| 5       | RESET/         | I           | Reset Pin. Initialize the LSI at the low level      |
| 6       | OTP            | I           | -   |
| 7       | SCL            | -           | Serial Clock  |
| 8       | SDI            | I           | Serial Data   |
| 9       | MLED_A         | I           | Power Supply for LED (Anode)                        |
| 10      | MLED_C1        | O           | LED1 Cathode Connection                             |
| 11      | MLED_C2        | O           | LED2 Cathode Connection                             |
| 12      | MAKER_ID(HIGH) | O           | Distinction of LCD maker (LGIT: High)               |
| 13      | GND            | -           | Ground  |

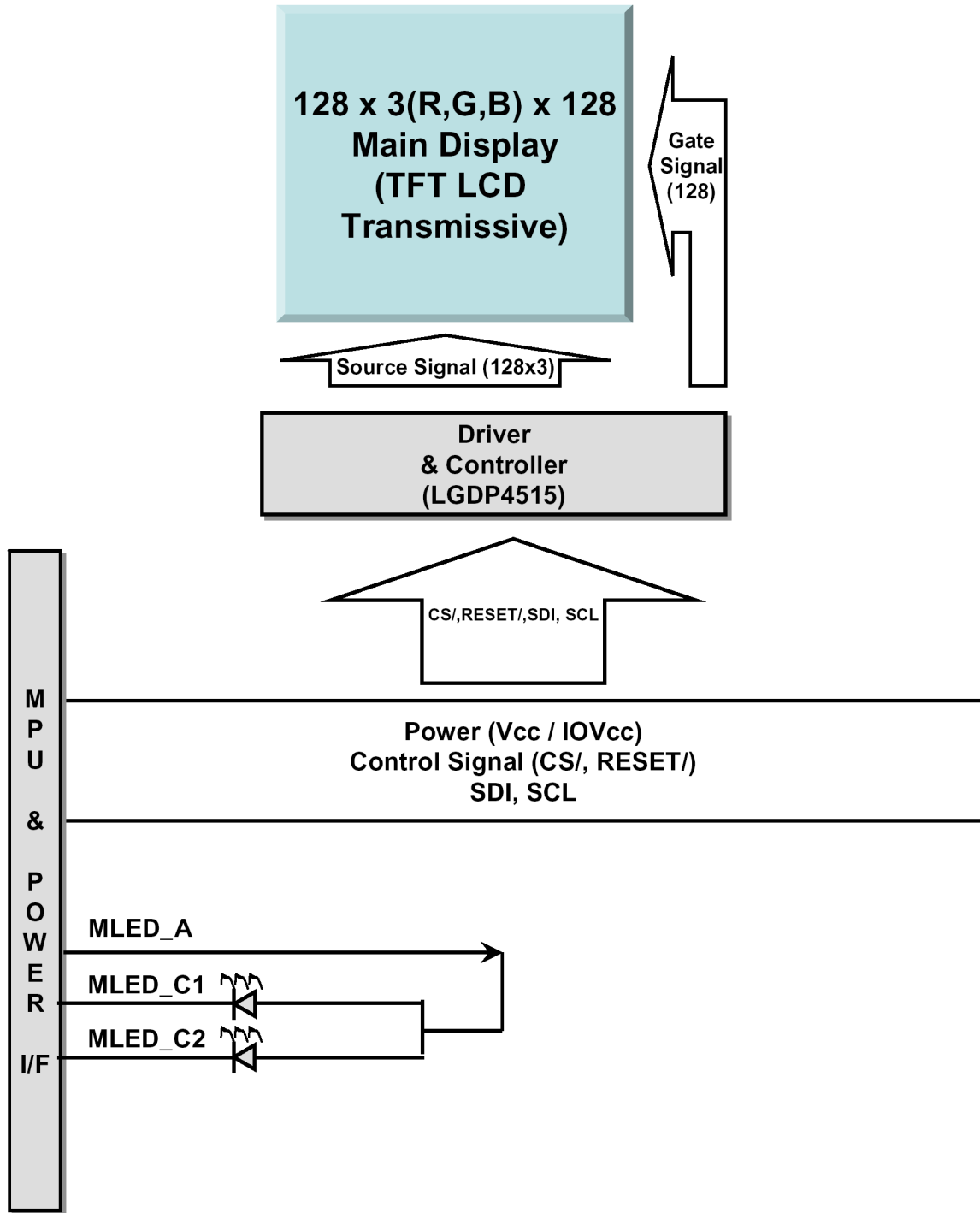


Figure. 3-9-2 IM152FBN5A Block Diagram



### 3.9 SIM& Micro SD Card Interface

#### SIM Connect

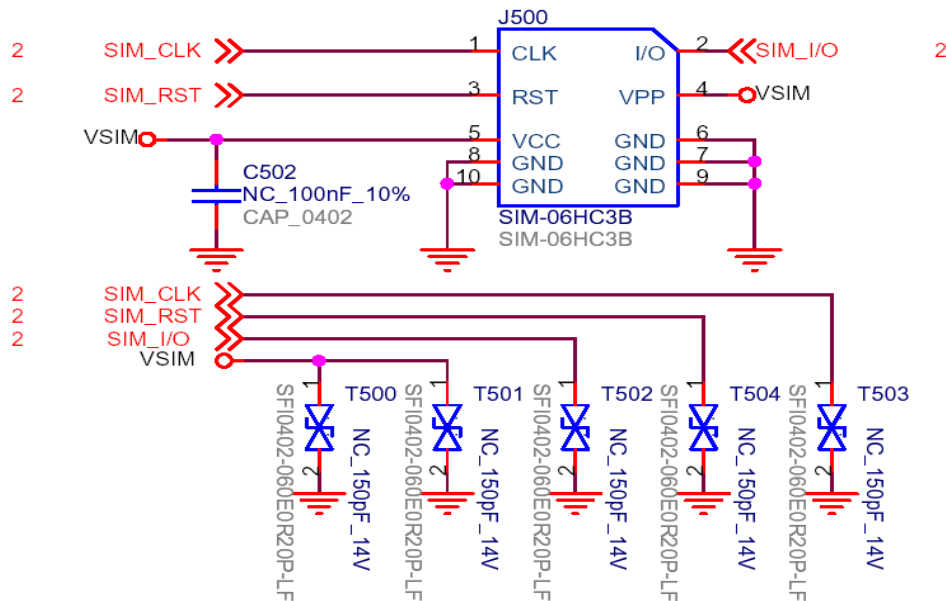


Figure.3-9-1 SIM CARD Interface

#### Micro SD Card

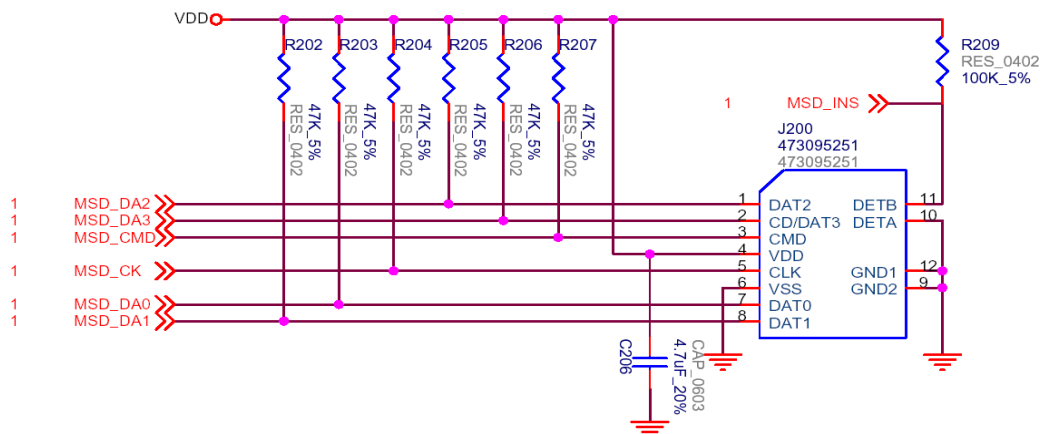


Figure.3-9-2 Micro SD CARD Interface

The MT6225 contains a dedicated smart card interface to allow the MCU access to the SIM card. It can operate via 4 terminals, using SIMVCC, SIMDATA, SIMRST, SIMCLK

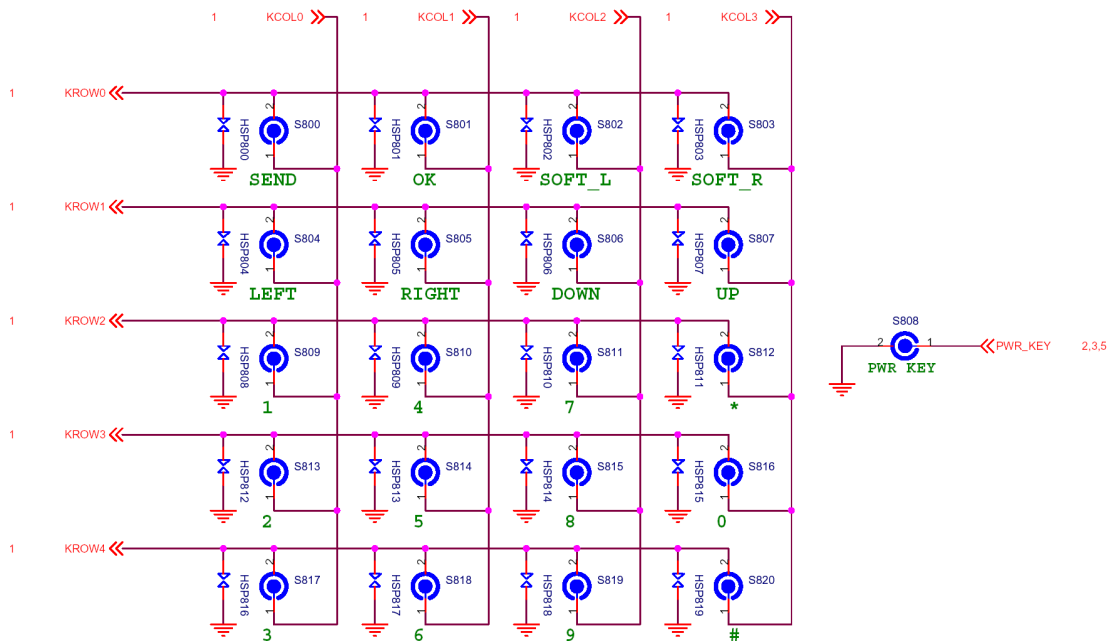
The SIMVCC is used to control the external voltage supply to the SIM card. SIMRST is used as the SIM card reset signal. SIMDATA and SIMCLK are used for data exchange purpose.

The SIM interface acts as a half duplex asynchronous communication port and its data format is composed of ten consecutive bits: a start bit in state Low, eight information bits, and a tenth bit used for parity checking.

The micro SD CARD is controlled by MT6225.

## 3.10 KEYPAD Interface

### Key Matrix

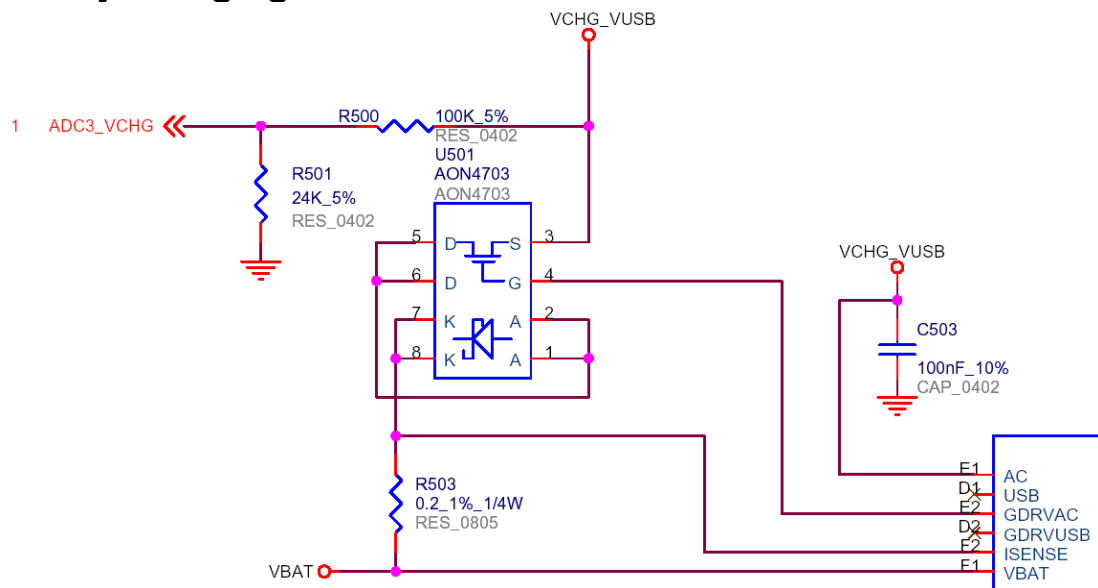


**Figure.3-10-1. KEYPAD Interface**

The keypad can be divided into two parts: one is the keypad interface including 4 columns and 5 rows; the other is the key detection block which provides key pressed, key released and de-bounce mechanisms. Each time the key is pressed or released, i.e. something different in the 4 x 5 matrix, the key detection block senses the change and recognizes if a key has been pressed or released. Whenever the key status changes and is stable, a KEYPAD IRQ is issued.

The MCU can then read the key(s) pressed directly in KP\_HI\_KEY, KP\_MID\_KEY and KP\_LOW\_KEY registers. To ensure that the key pressed information is not missed, the status register in keypad is not read-cleared by APB read command. The status register can only be changed by the key-pressed detection FSM.

### 3.11 Battery Charging Block Interface



**Figure.3-11-1 Charging IC Interface**

The AON4703 is controlled by MT6318.

## 3.12 Audio Interface

### AUDIO AMP

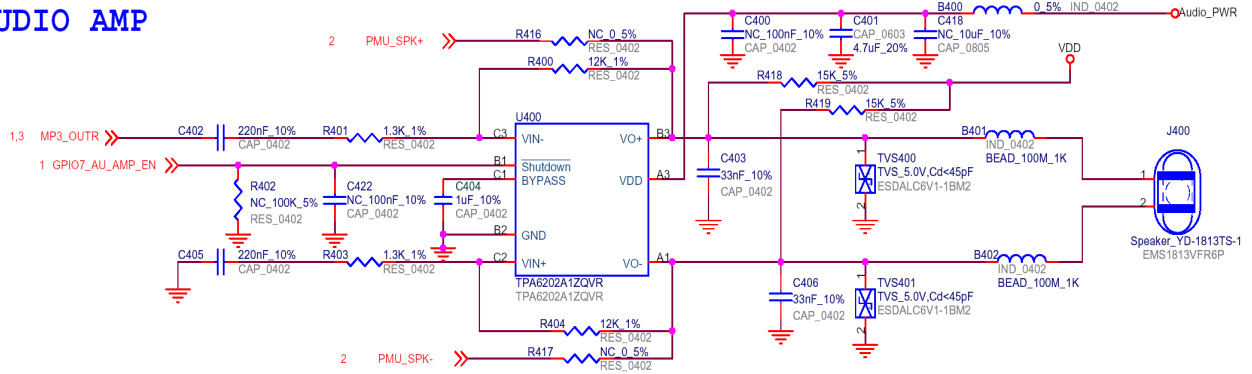
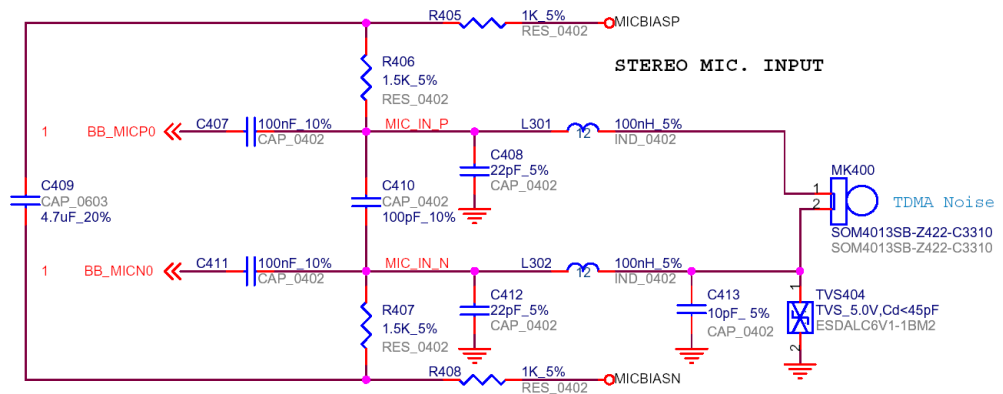


Figure.3-12-1 Main Speaker Interface

### Microphone



### RECEIVER

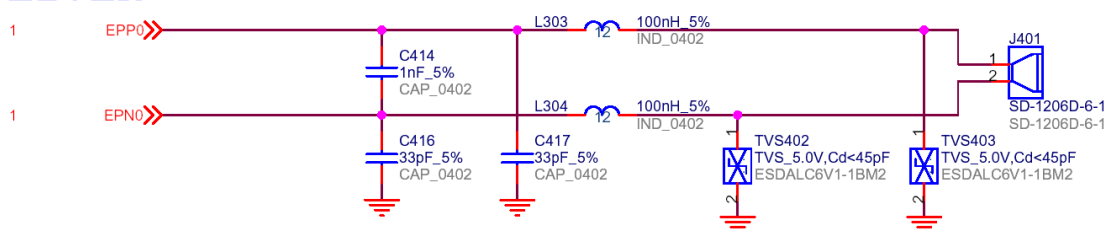
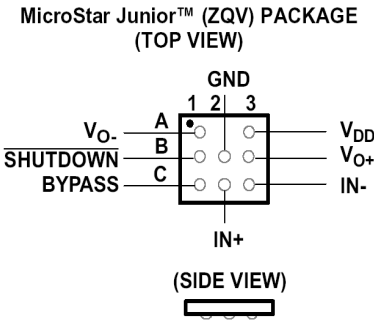


Figure.3-12-2 Main Microphone&Recevice Interface

The TPA6202A1 is a 1.25W mono amplifier designed to drive a speaker with at least 8-Ω impedance while consuming less than 37 mm2 (ZQV package option) total printed-circuit board (PCB) area in most applications. This device operates from 2.5V to 5.5V, drawing only 1.7mA of quiescent supply current.

The TPA6202A1 is available in the space-saving 2 mm x 2 mm MicroStar Junior™ BGA package.

A fast start-up time of 4ms with minimal pop makes the TPA6202A1 ideal for wireless handsets.

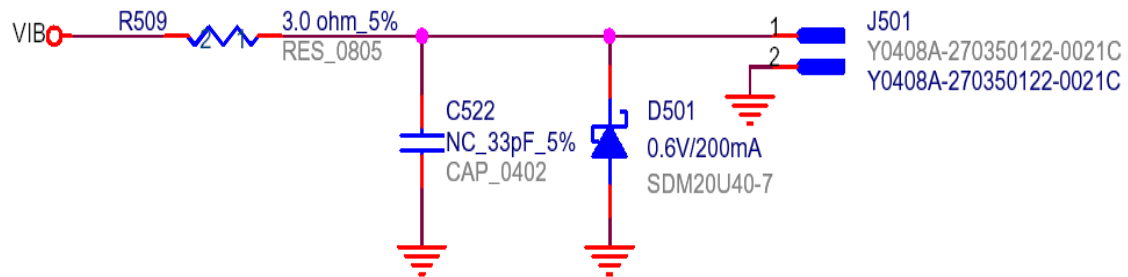


Terminal Functions

| TERMINAL        |     | I/O | DESCRIPTION  |
|-----------------|-----|-----|--|
| NAME            | ZQV |     |  |
| BYPASS          | C1  | I   | Mid-supply voltage. Adding a bypass capacitor improves PSRR.   |
| GND             | B2  | I   | High-current ground  |
| IN-             | C3  | I   | Negative differential input  |
| IN+             | C2  | I   | Positive differential input  |
| SHUTDOWN        | B1  | I   | Shutdown terminal (active low logic)   |
| V <sub>DD</sub> | A3  | I   | Supply voltage terminal  |
| V <sub>O+</sub> | B3  | O   | Positive BTL output  |
| V <sub>O-</sub> | A1  | O   | Negative BTL output  |
| Thermal Pad     | N/A |     | Connect to ground. Thermal pad must be soldered down in all applications to properly secure device on the PCB. |

### 3.13 Vibrator Interface

#### VIBRATOR

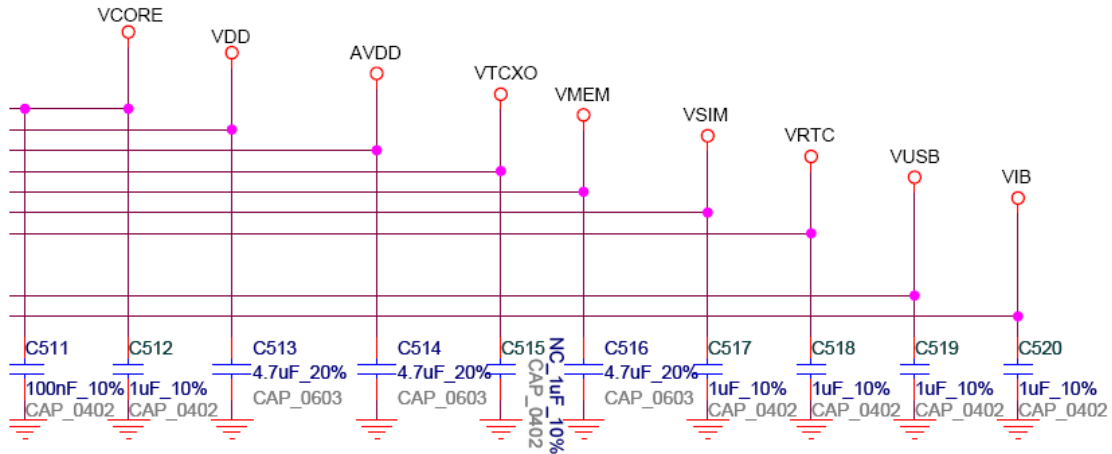


**Figure.3-13-1Vibrator Interface**

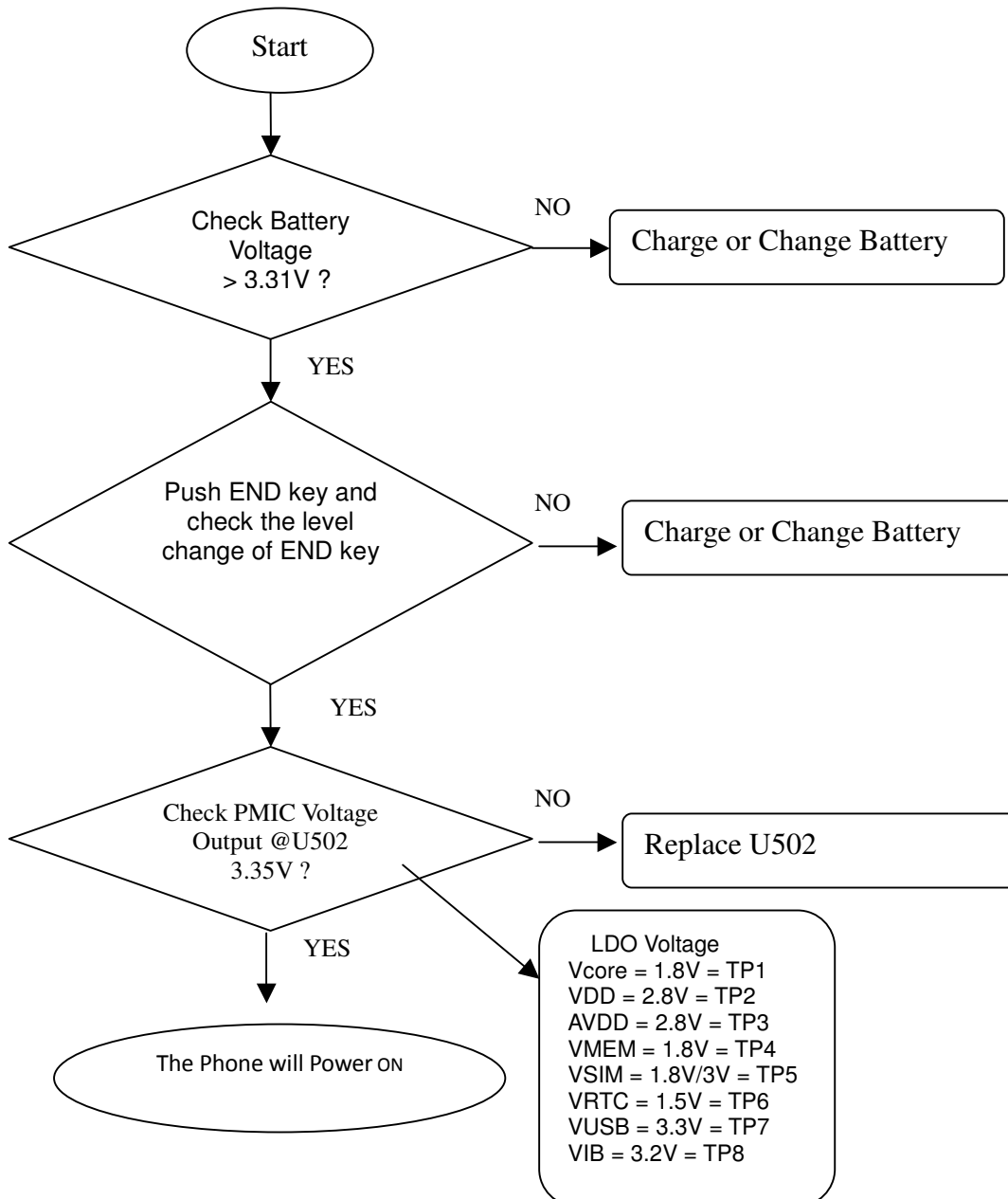
This handset has Vibrator operation. Control signal is controlled by MT6318 with PMIC



#### 4.1.2 Circuit Diagram



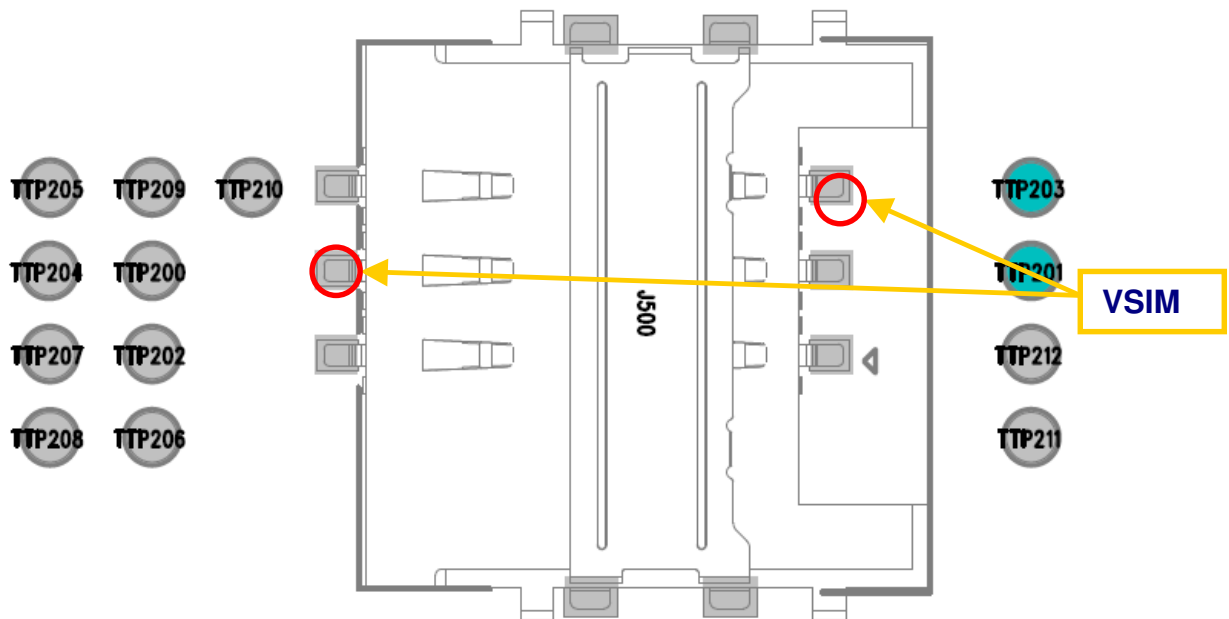
#### 4.1.3 Checking Flow



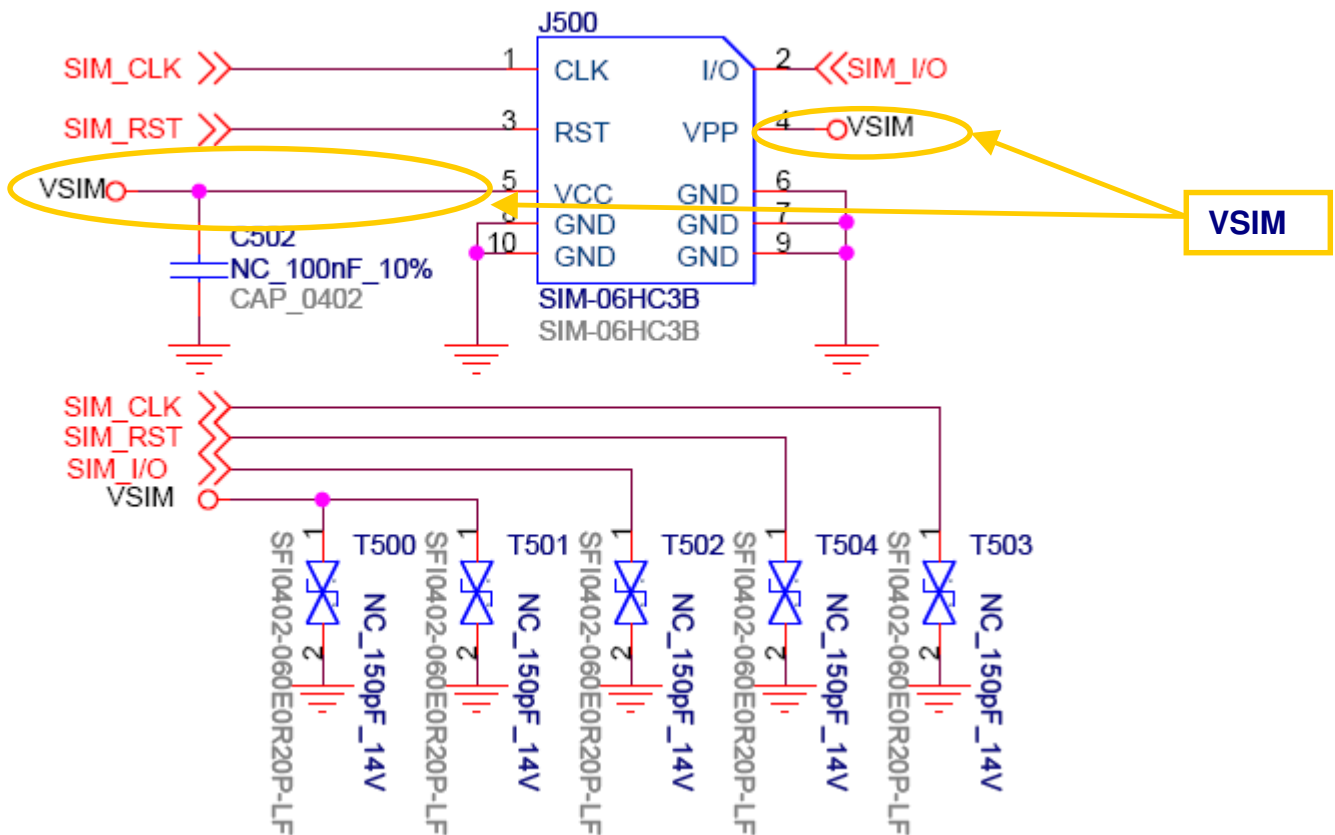


## 4.2 SIM Card Trouble

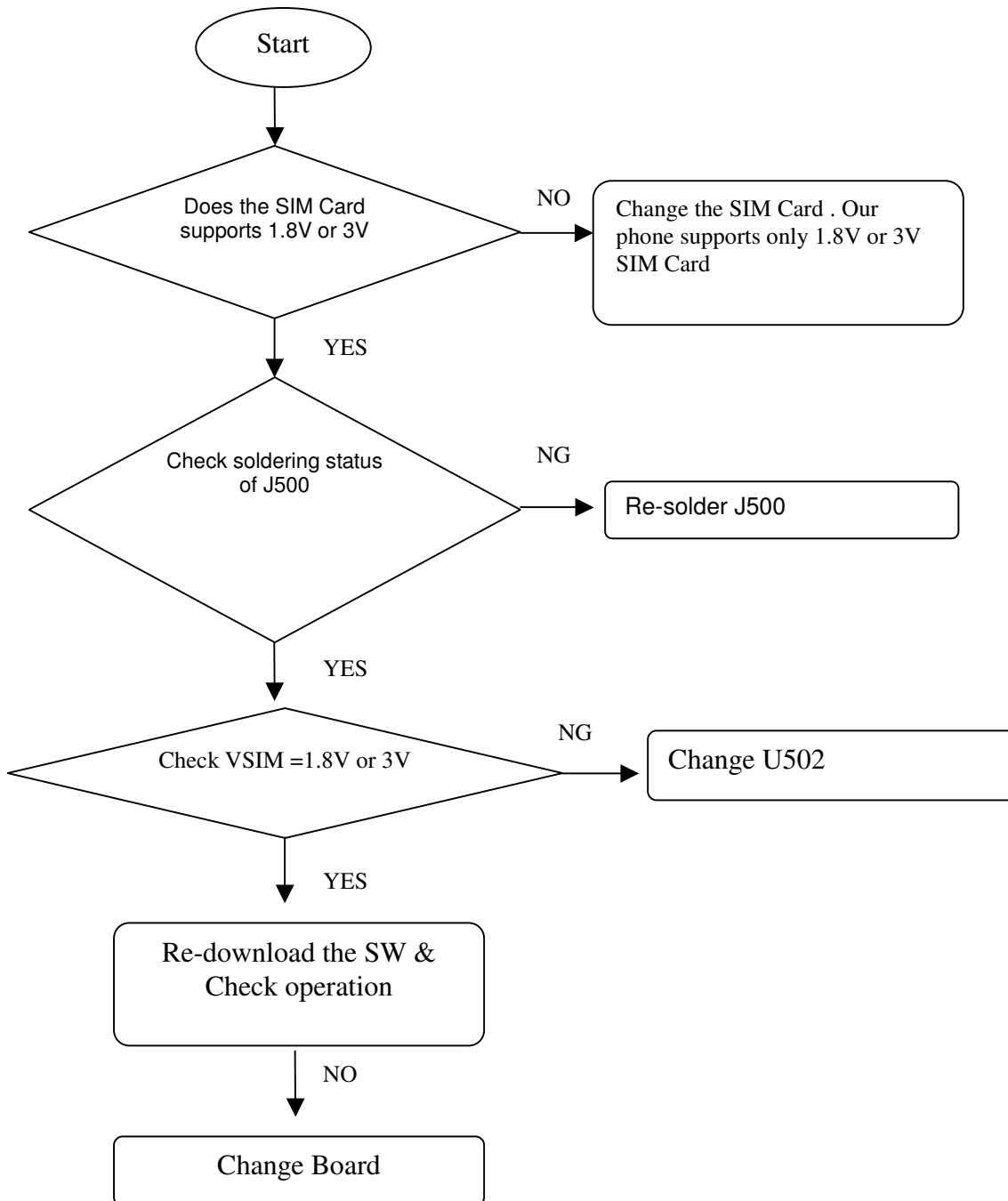
### 4.2.1 Test Point



### 4.2.2 Circuit Diagram

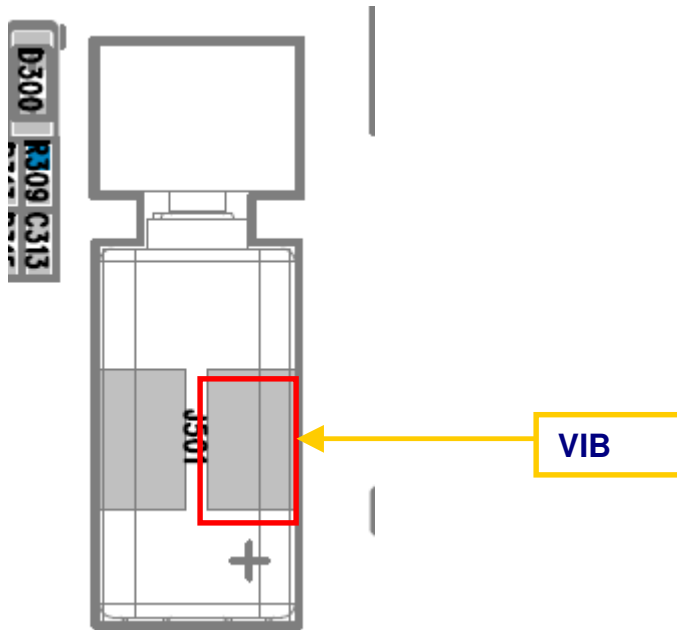


### 4.2.3 Checking Flow

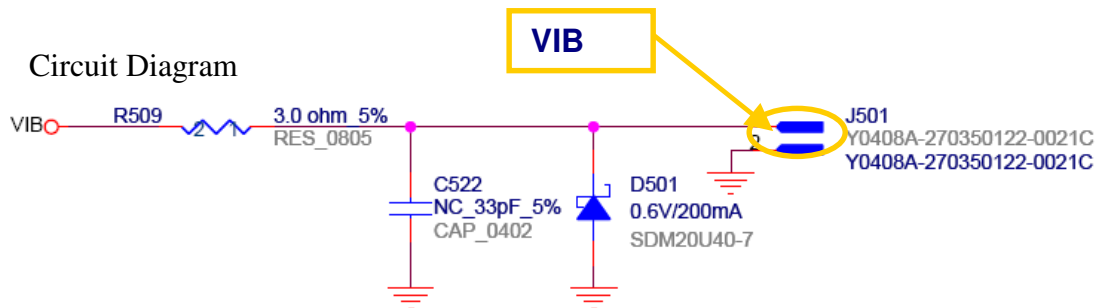


### 4.3 Vibrator Trouble

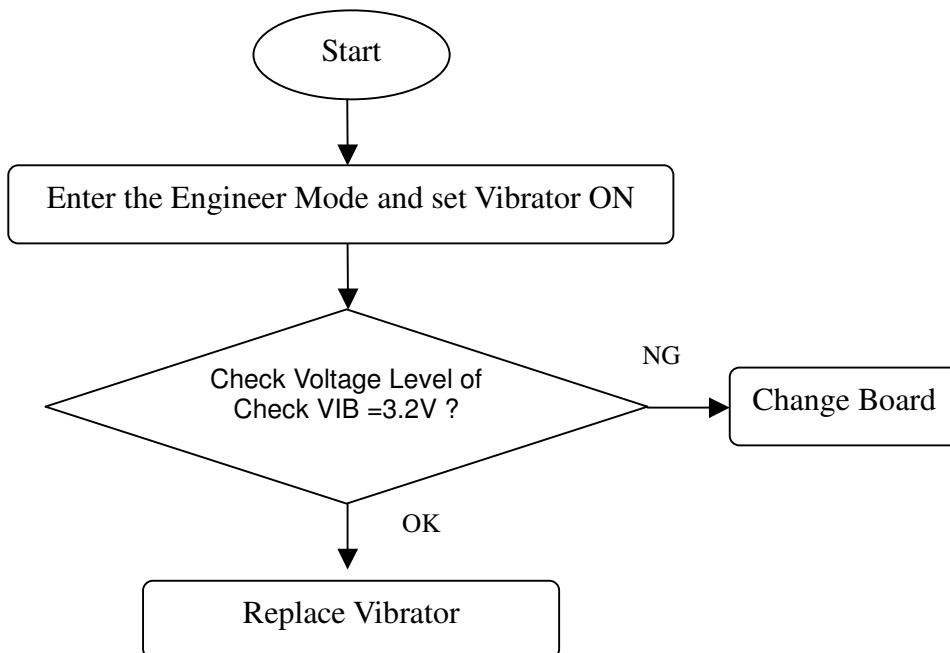
#### 4.3.1 Test Point



#### 4.3.2 Circuit Diagram

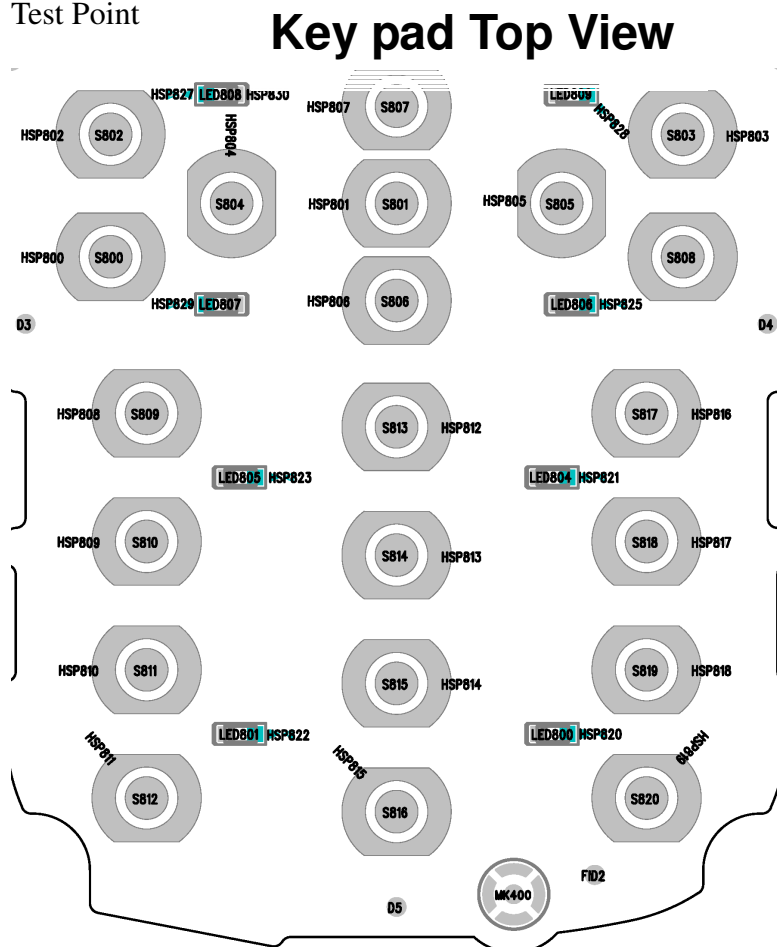


#### 4.3.3 Checking Flow

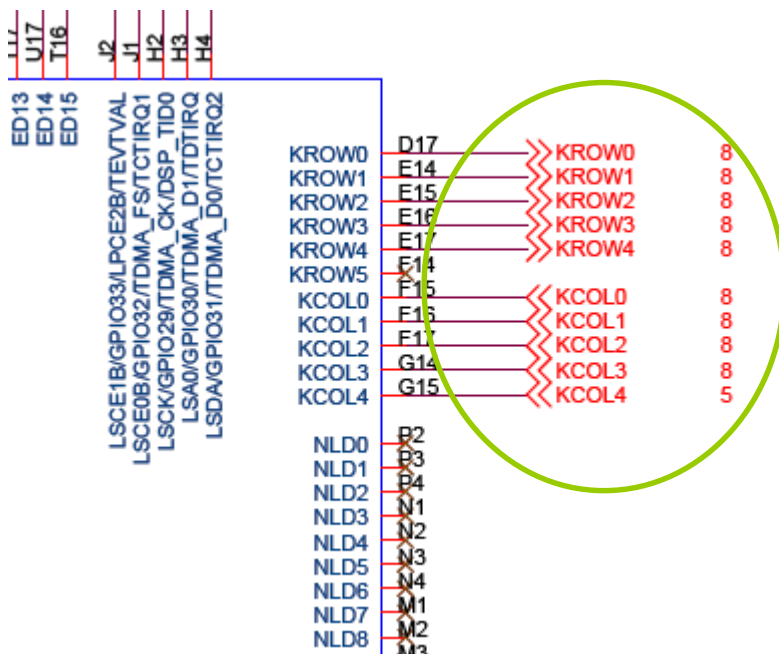


## 4.4 Keypad Trouble

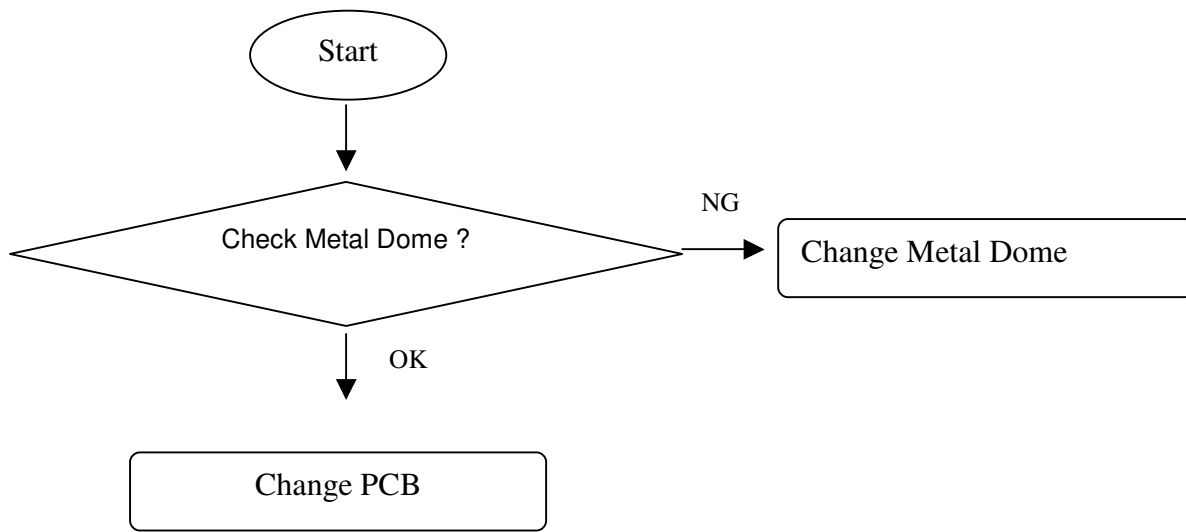
### 4.4.1 Test Point



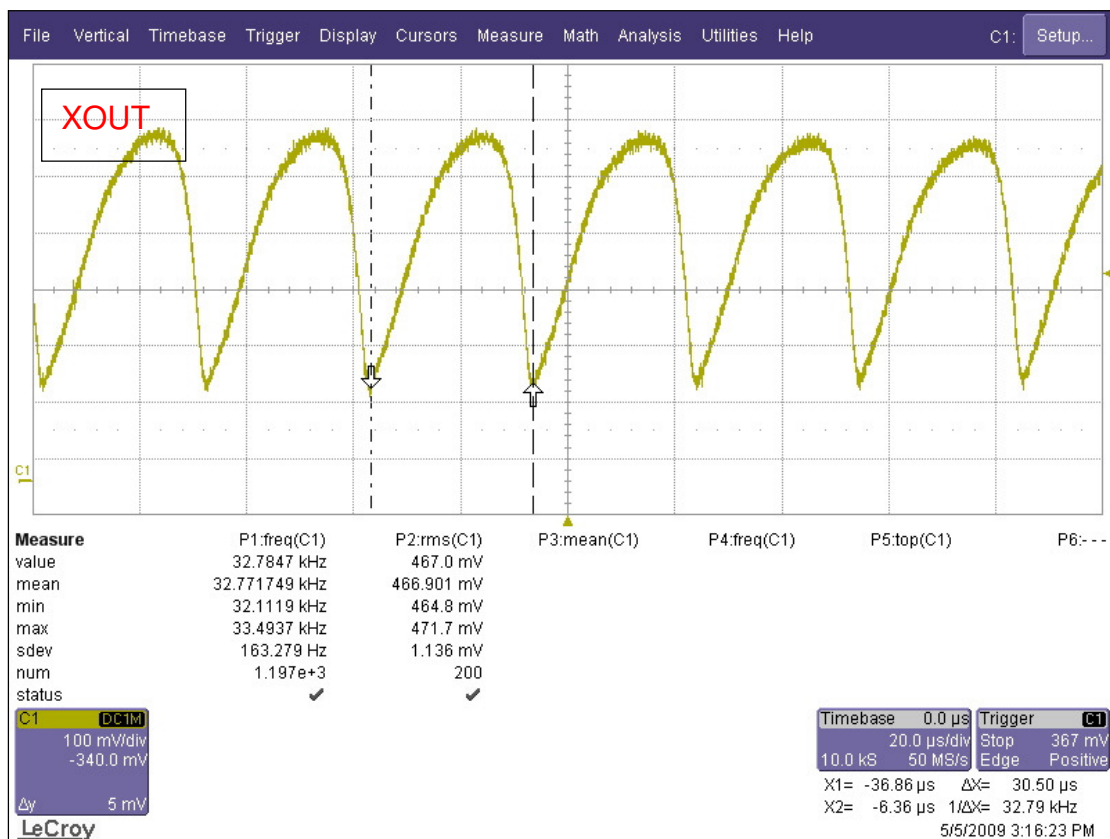
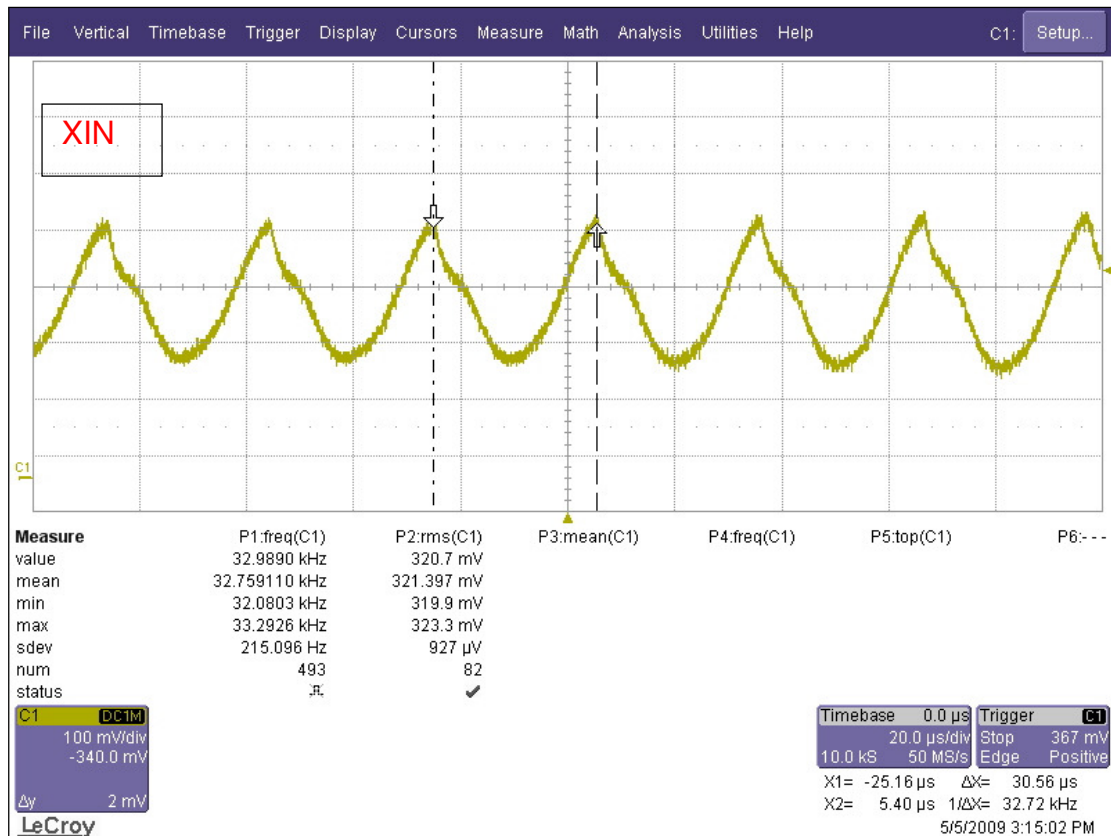
### 4.4.2 Circuit Diagram



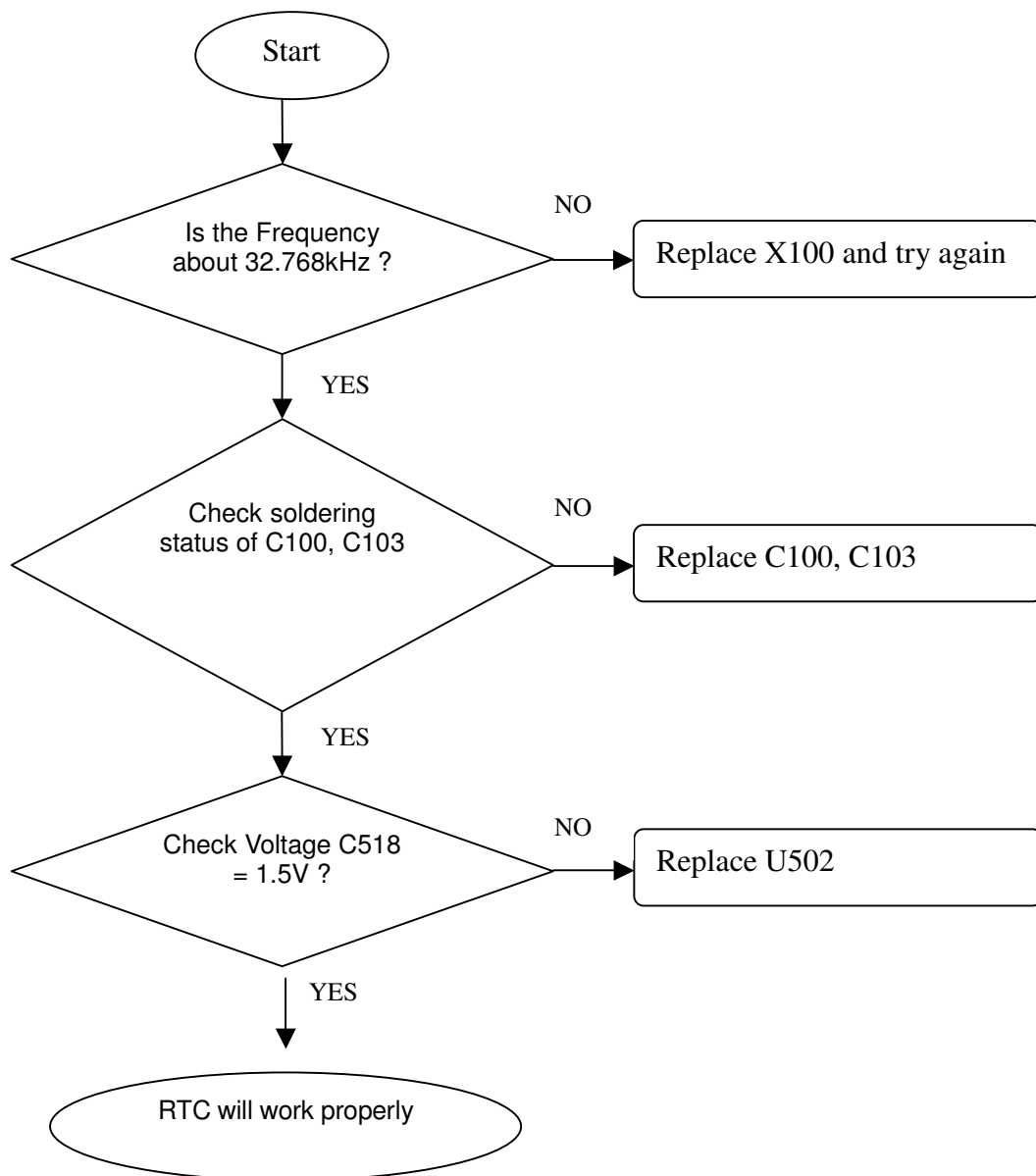
#### 4.4.3 Checking Flow





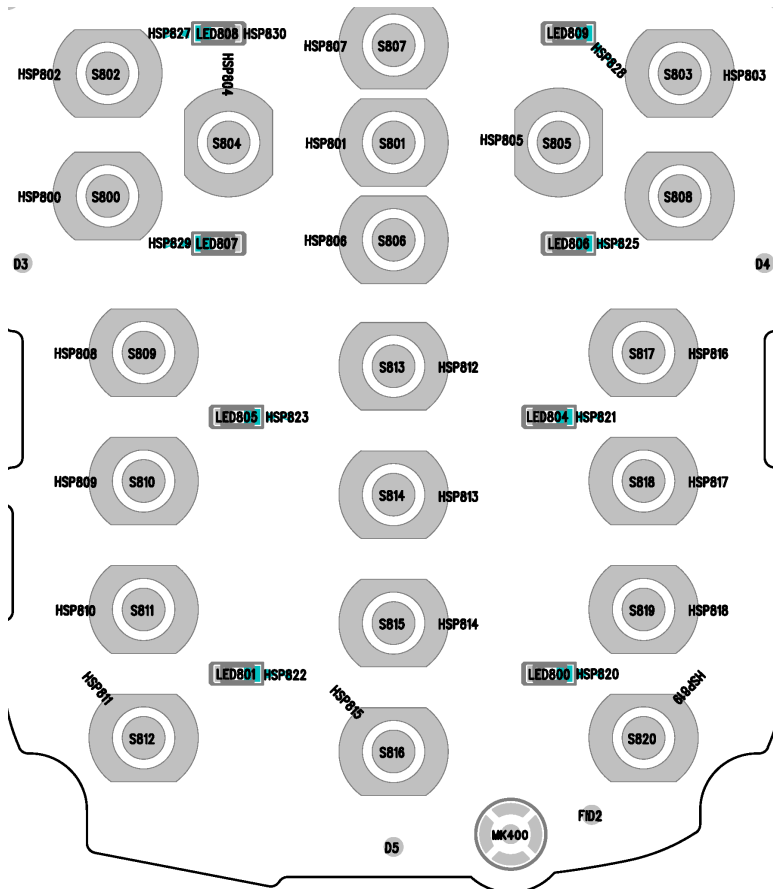


### 4.5.3 Checking Flow

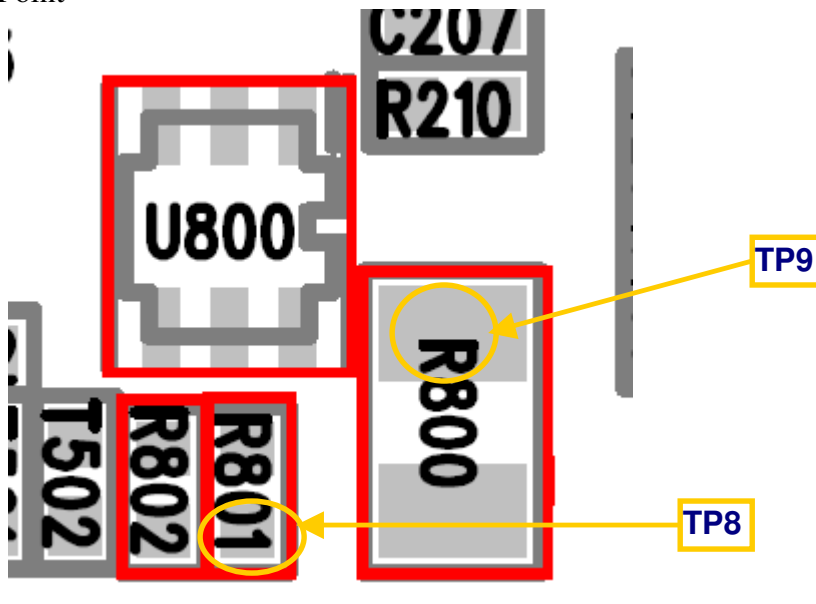




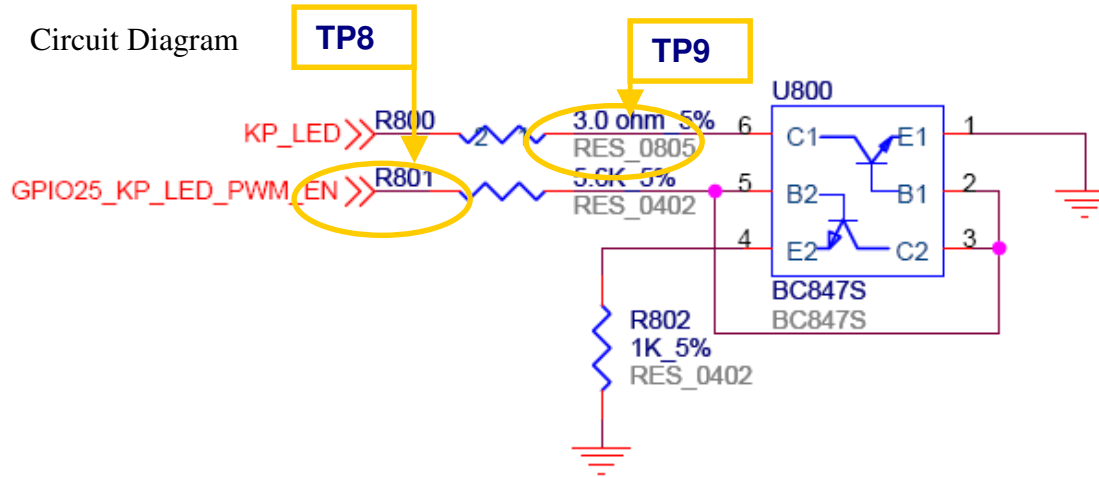
## 4.6 Key Backlight Trouble



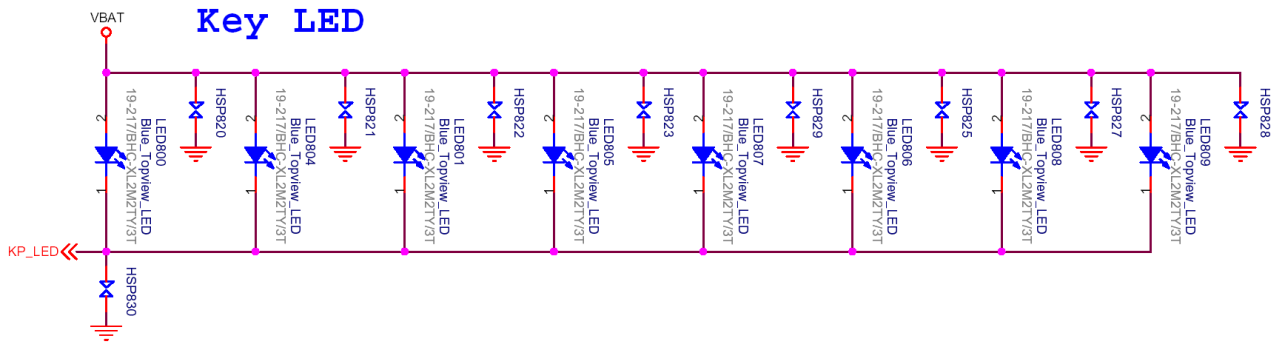
### 4.6.1 Test Point



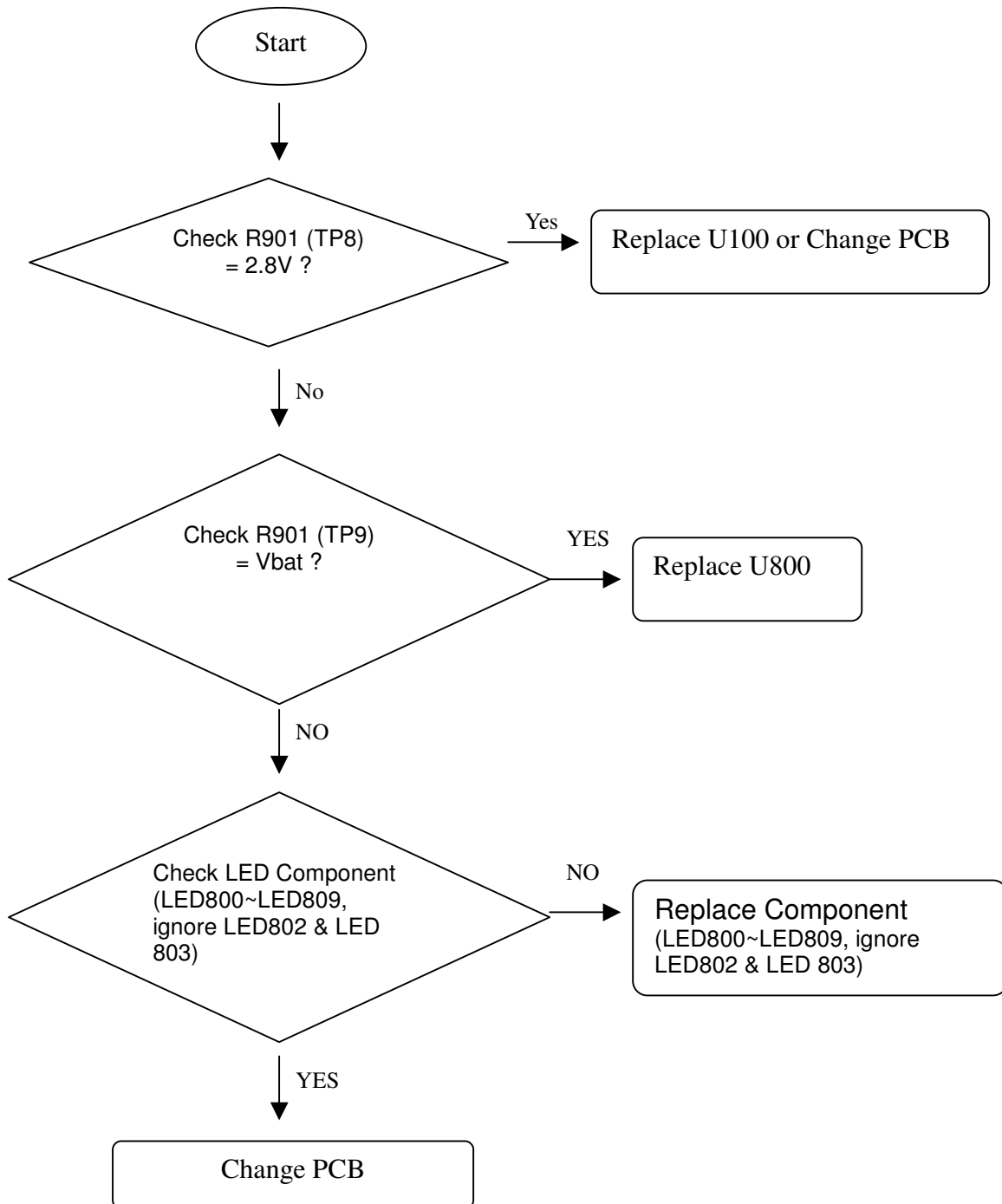
#### 4.6.2 Circuit Diagram



090618 delete



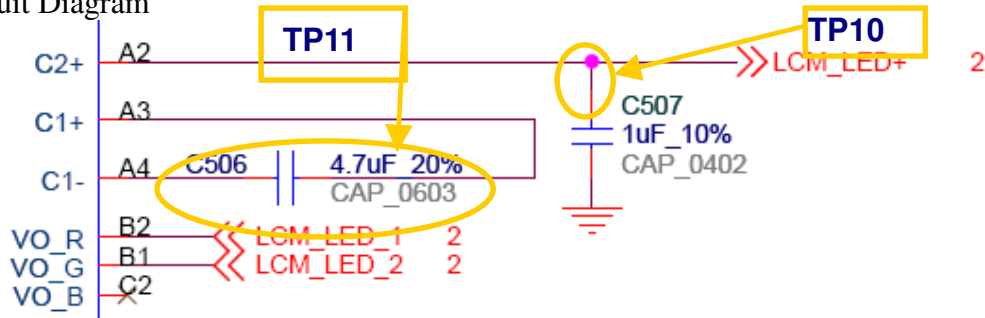
#### 4.6.3 Checking Flow



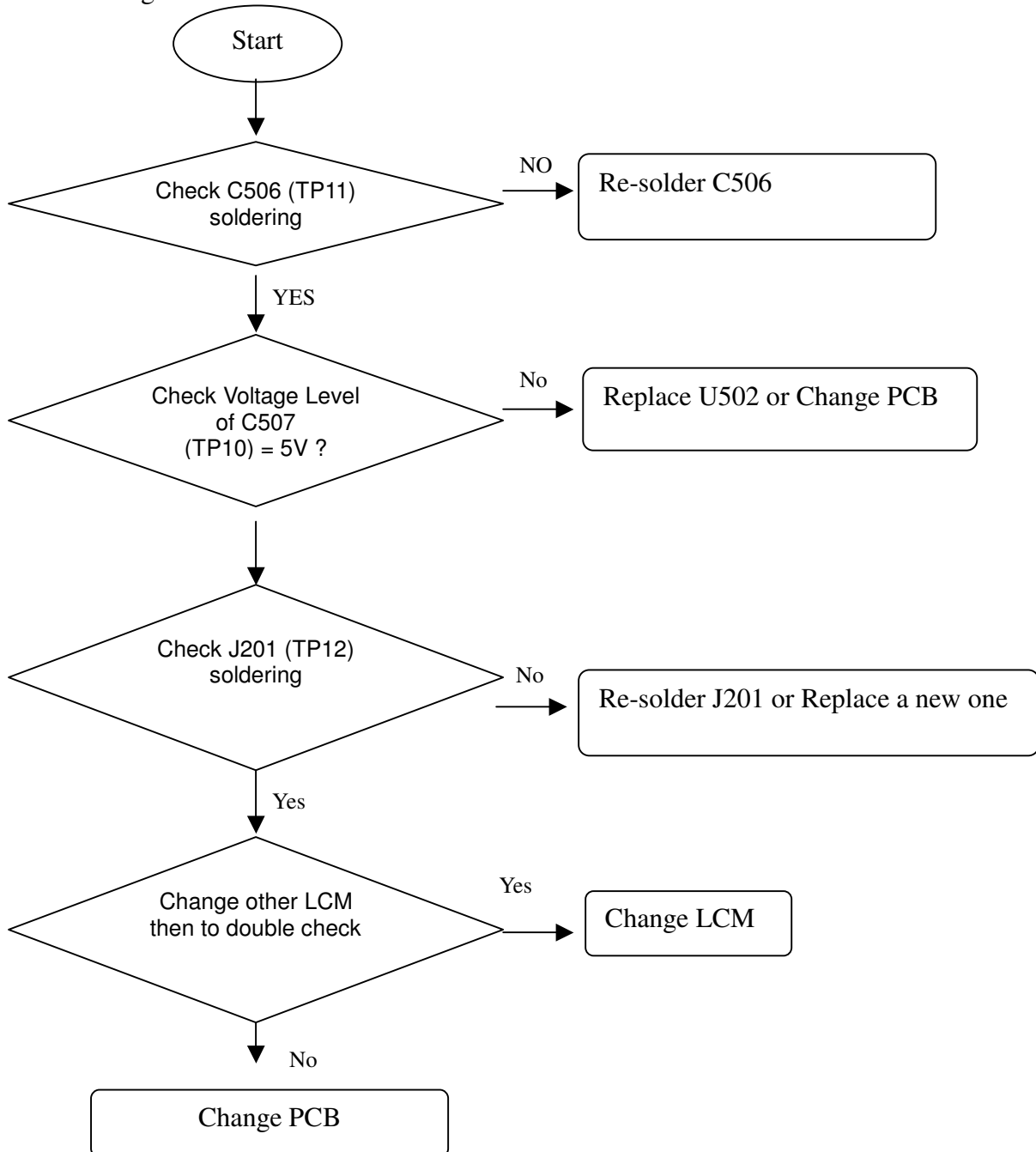
#### 4.7.1 Test Point



#### 4.7.2 Circuit Diagram

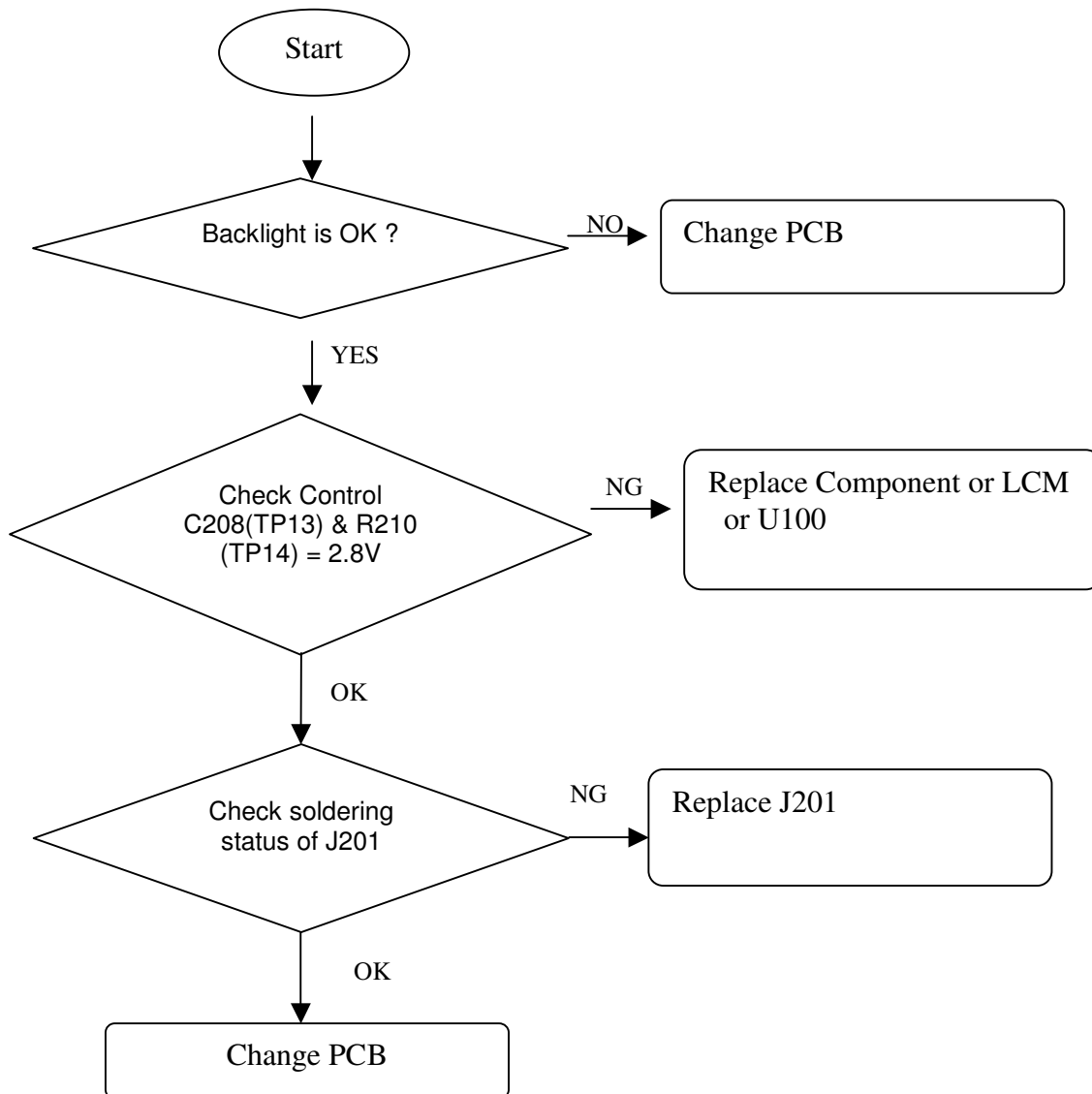


#### 4.7.3 Checking Flow





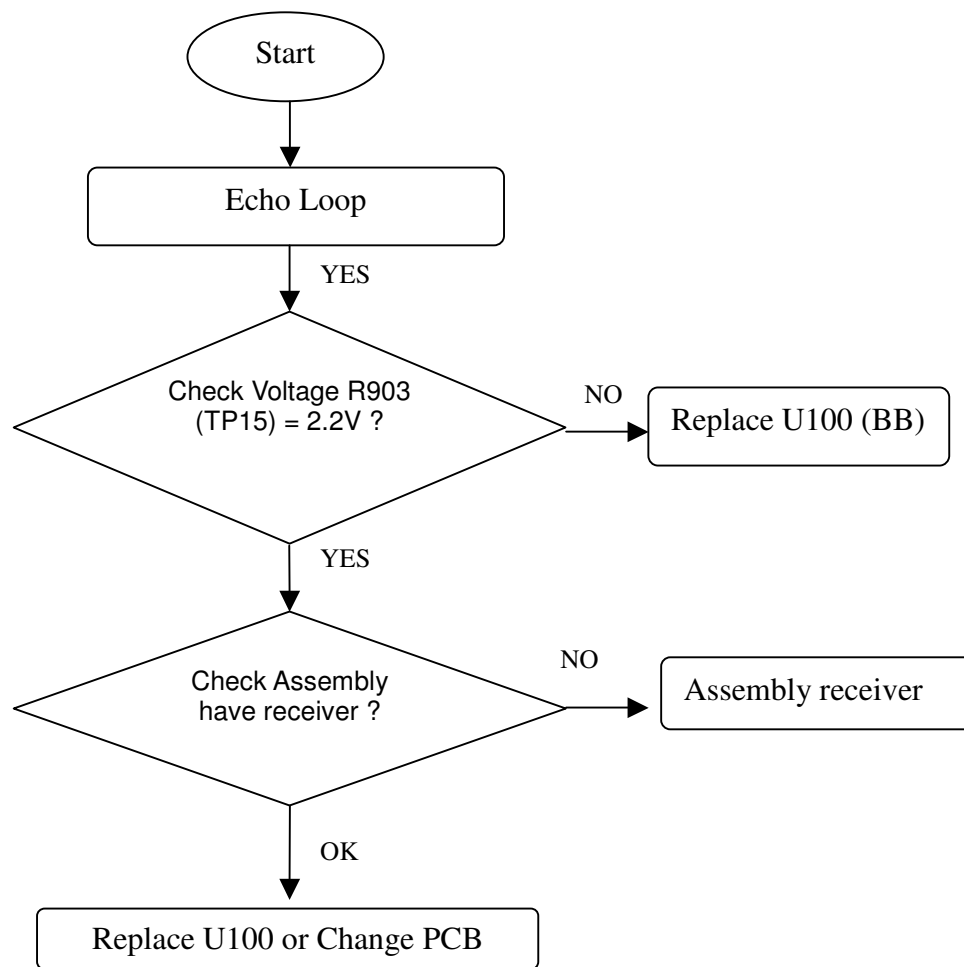
### 4.8.3 Checking Flow





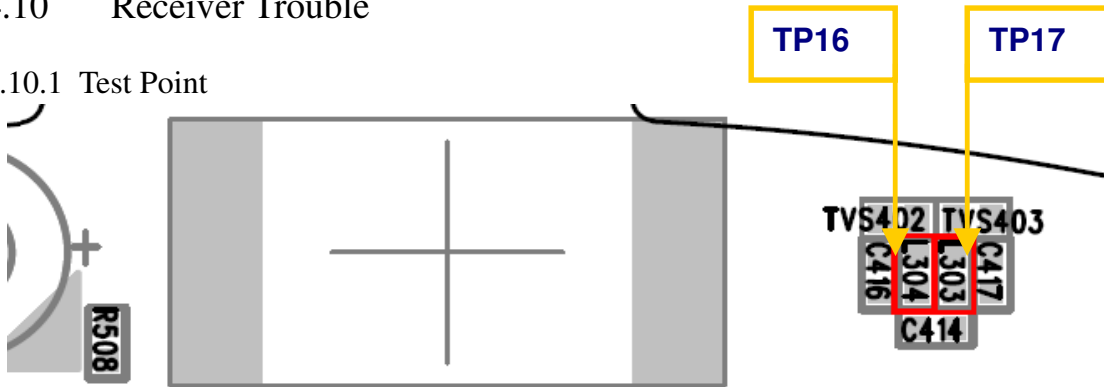


#### 4.9.3 Checking Flow

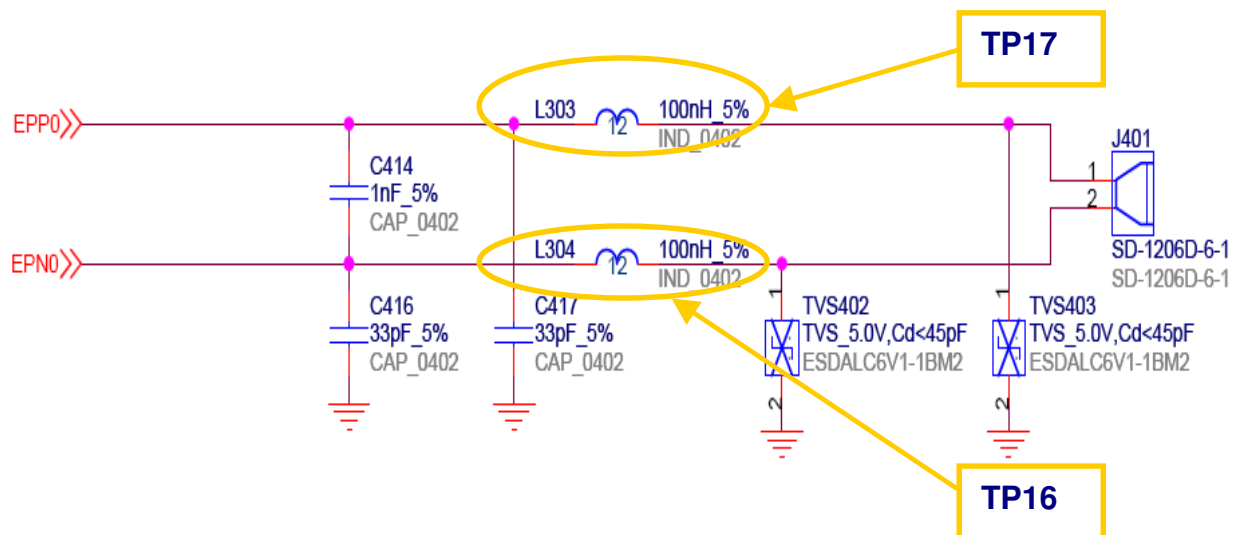


## 4.10 Receiver Trouble

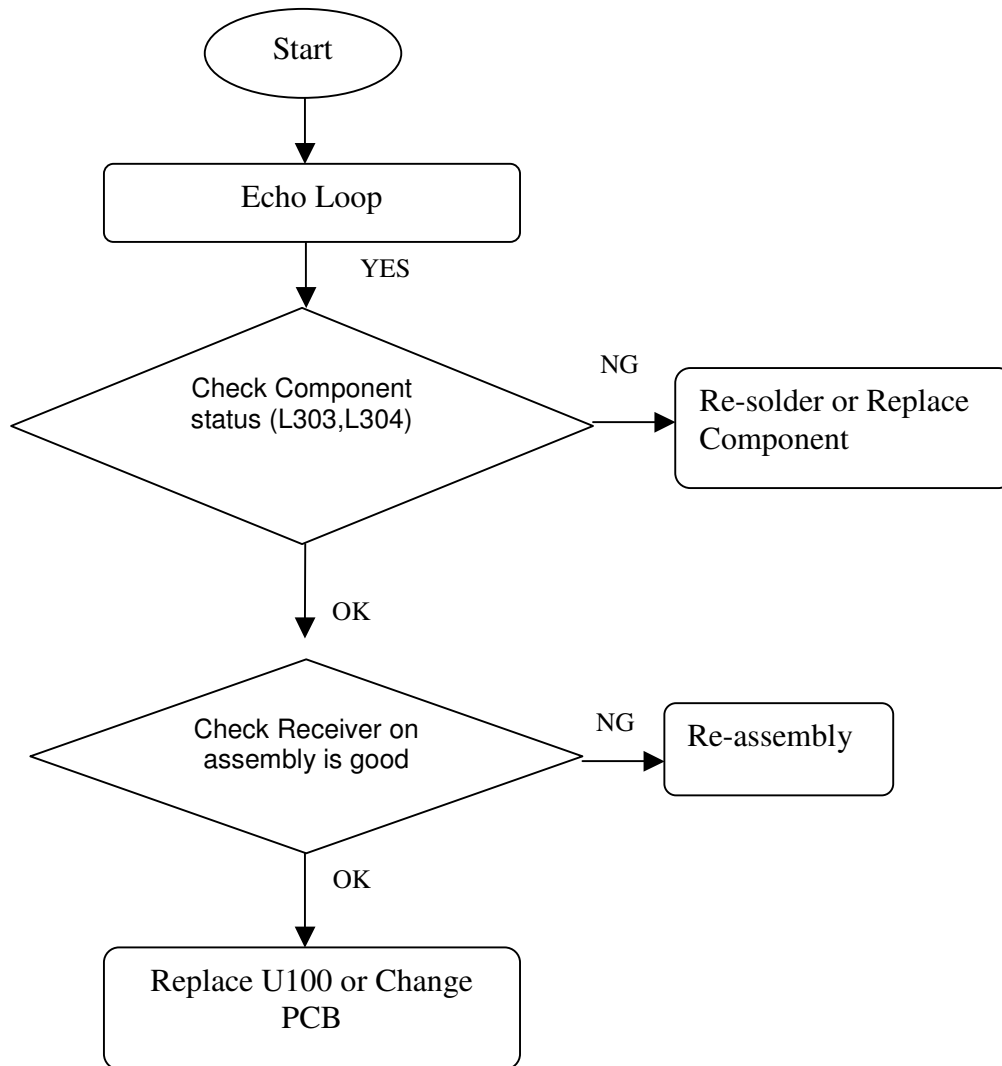
### 4.10.1 Test Point



### 4.10.2 Circuit Diagram

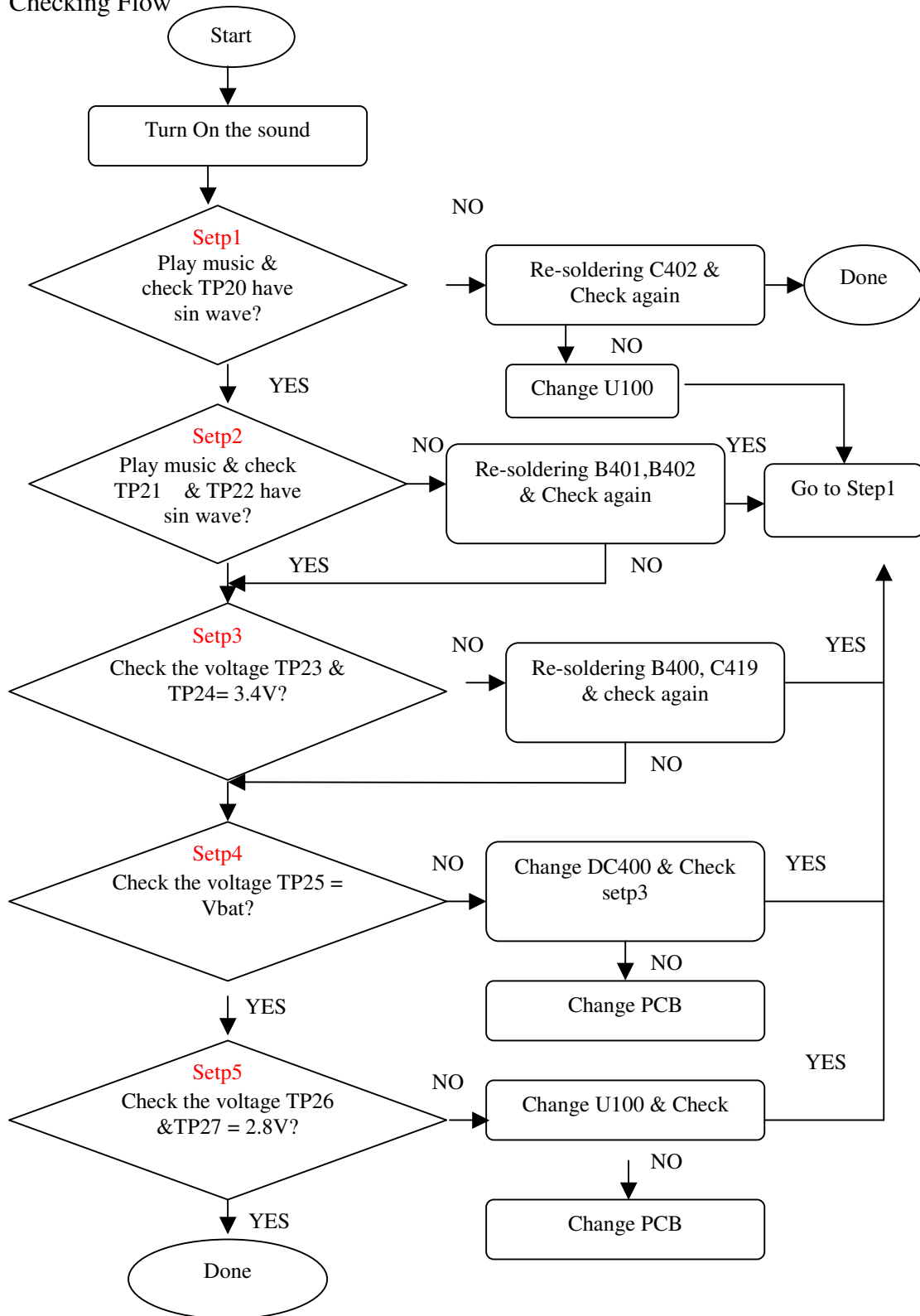


#### 4.10.3 Checking Flow





#### 4.11.3 Checking Flow



#### 4.12.1 Test Point

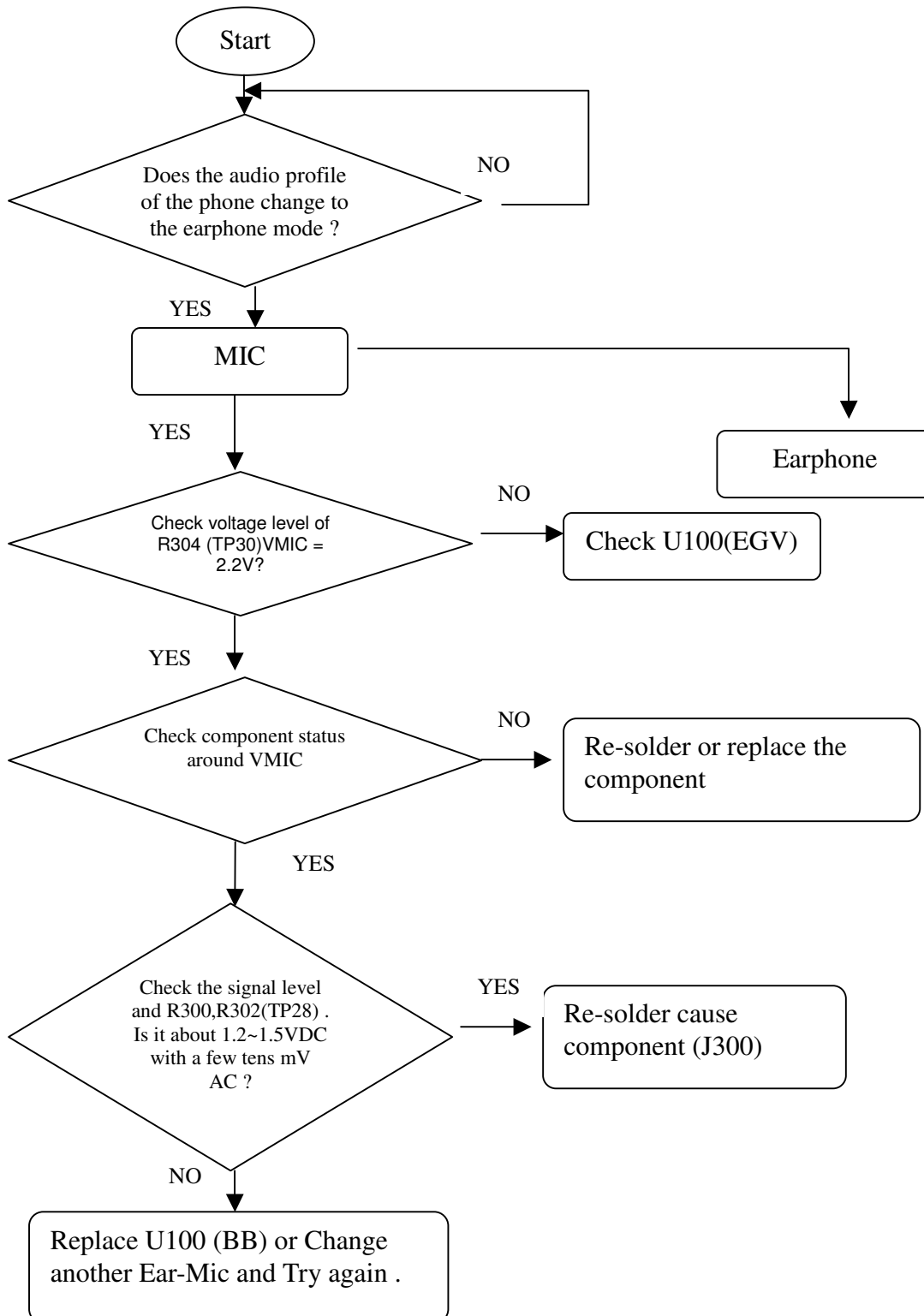
2.1 Test Point

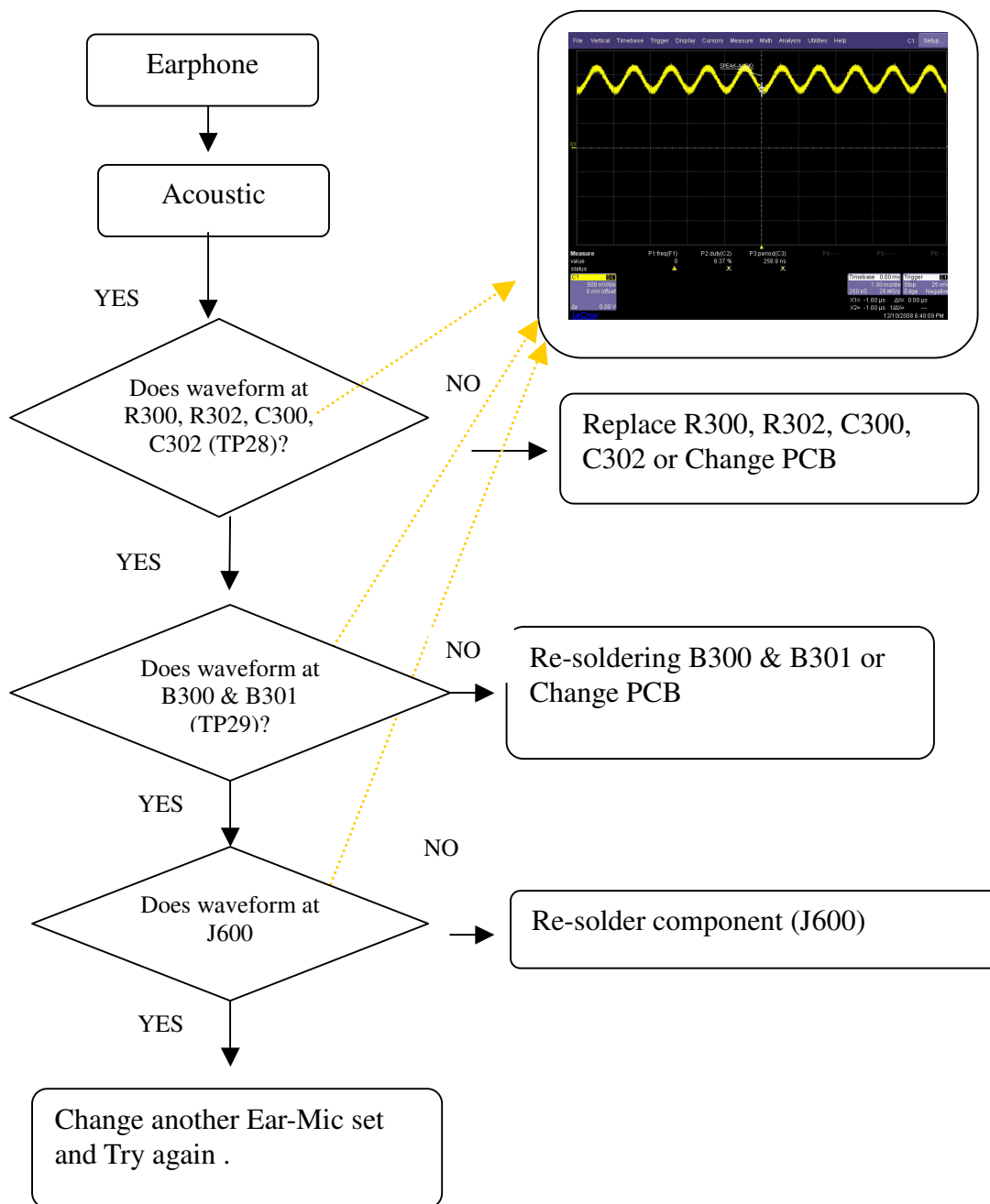
The image displays two PCB layout diagrams. The left diagram shows a central component U801 with test points TP28 and TP29. TP28 is at the bottom, connected to C300, C301, C302, and C303. TP29 is at the top, connected to B301, B300, and T301. The right diagram shows a component C321 with test point TP30 at the bottom, connected to C304, R304, C306, R306, C308, R308, and C310.

The diagram shows the internal circuitry of the TTP300 module. Key components include:

- TP28:** Located at the input of the microphone (FSA2268TUMX) at pin 2A. It consists of a 33Ω resistor (R300) and a 100μF capacitor (C300) in parallel.
- TP29:** Located at the output of the microphone (FSA2268TUMX) at pin 2B1. It consists of a 100nH inductor (B300) and a 100μF capacitor (C301) in parallel.
- TP30:** Located at the input of the ADC4\_MIC\_H\_DET at pin 1. It consists of a 100nF capacitor (C305) and a 100nF capacitor (C308) in parallel.
- Microphone:** FSA2268TUMX, a digital MEMS microphone.
- ADC:** ADC4\_MIC\_H\_DET, a digital microphone interface.
- Other components:** Various resistors (R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R784, R785, R786, R787, R788, R789, R790, R791, R792, R793, R794, R795, R796, R797, R798, R799, R800, R801, R802, R803, R804, R805, R806, R807, R808, R809, R810, R811, R812, R813, R814, R815, R816, R817, R818, R819, R820, R821, R822, R823, R824, R825, R826, R827, R828, R829, R830, R831, R832, R833, R834, R835, R836, R837, R838, R839, R840, R841, R842, R843, R844, R845, R846, R847, R848, R849, R850, R851, R852, R853, R854, R855, R856, R857, R858, R859, R860, R861, R862, R863, R864, R865, R866, R867, R868, R869, R870, R871, R872, R873, R874, R875, R876, R877, R878, R879, R880, R881, R882, R883, R884, R885, R886, R887, R888, R889, R890, R891, R892, R893, R894, R895, R896, R897, R898, R899, R900, R901, R902, R903, R904, R905, R906, R907, R908, R909, R910, R911, R912, R913, R914, R915, R916, R917, R918, R919, R920, R921, R922, R923, R924, R925, R926, R927, R928, R929, R930, R931, R932, R933, R934, R935, R936, R937, R938, R939, R940, R941, R942, R943, R944, R945, R946, R947, R948, R949, R950, R951, R952, R953, R954, R955, R956, R957, R958, R959, R960, R961, R962, R963, R964, R965, R966, R967, R968, R969, R970, R971, R972, R973, R974, R975, R976, R977, R978, R979, R980, R981, R982, R983, R984, R985, R986, R987, R988, R989, R990, R991, R992, R993, R994, R995, R996, R997, R998, R999, R1000, R1001, R1002, R1003, R1004, R1005, R1006, R1007, R1008, R1009, R1010, R1011, R1012, R1013, R1014, R1015, R1016, R1017, R1018, R1019, R1020, R1021, R1022, R1023, R1024, R1025, R1026, R1027, R1028, R1029, R1030, R1031, R1032, R10

#### 4.12.3 Checking Flow

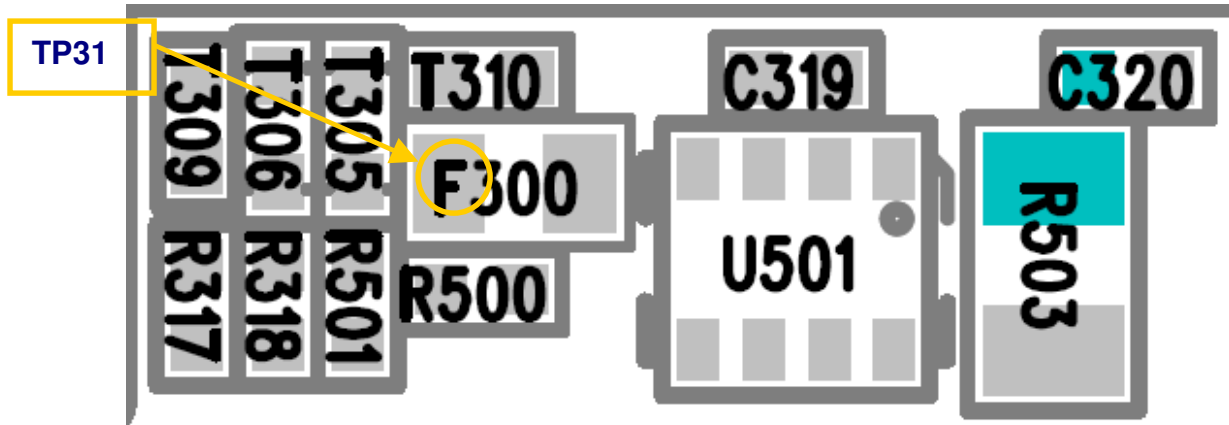




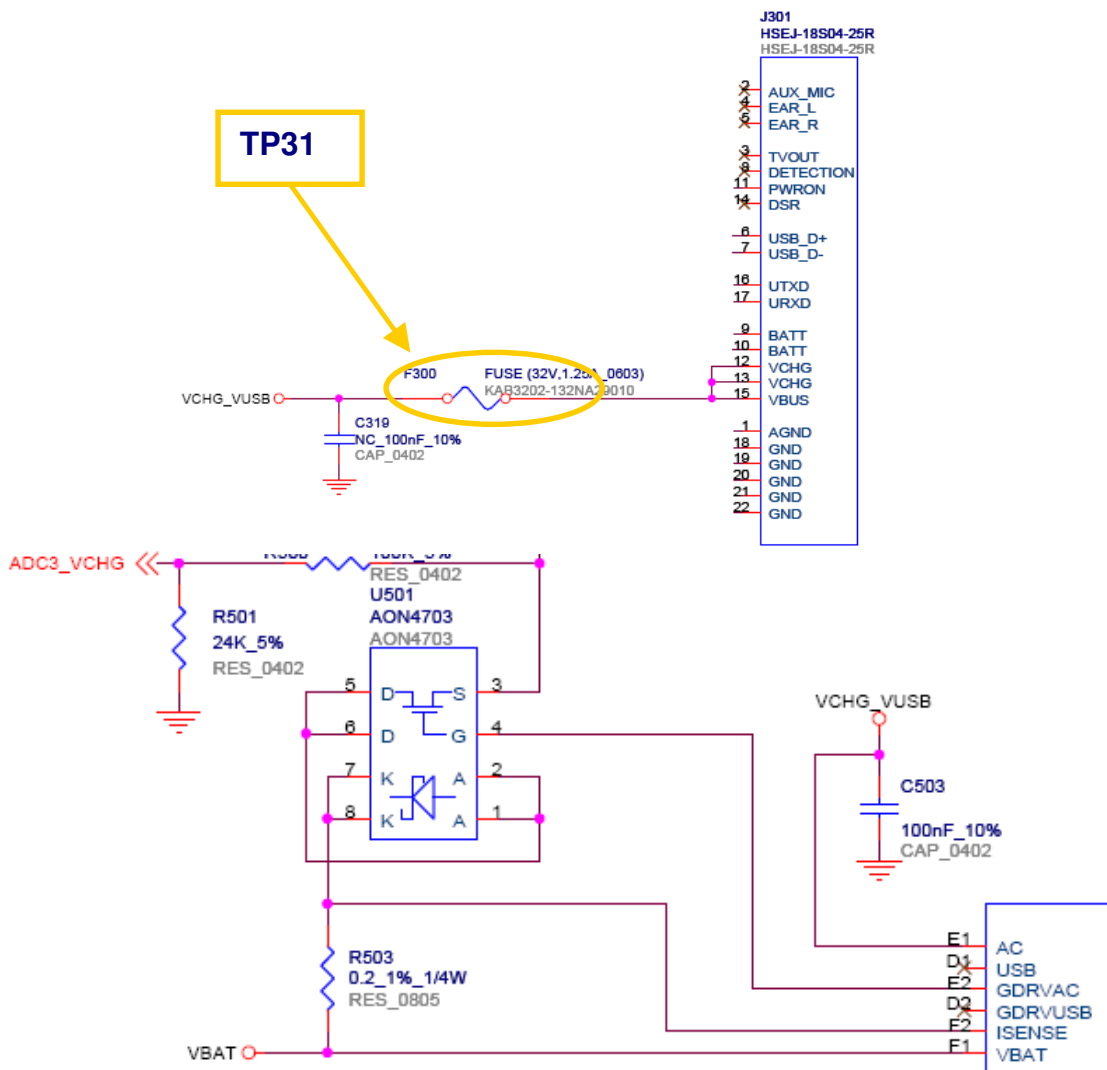


## 4.13 Charging Trouble

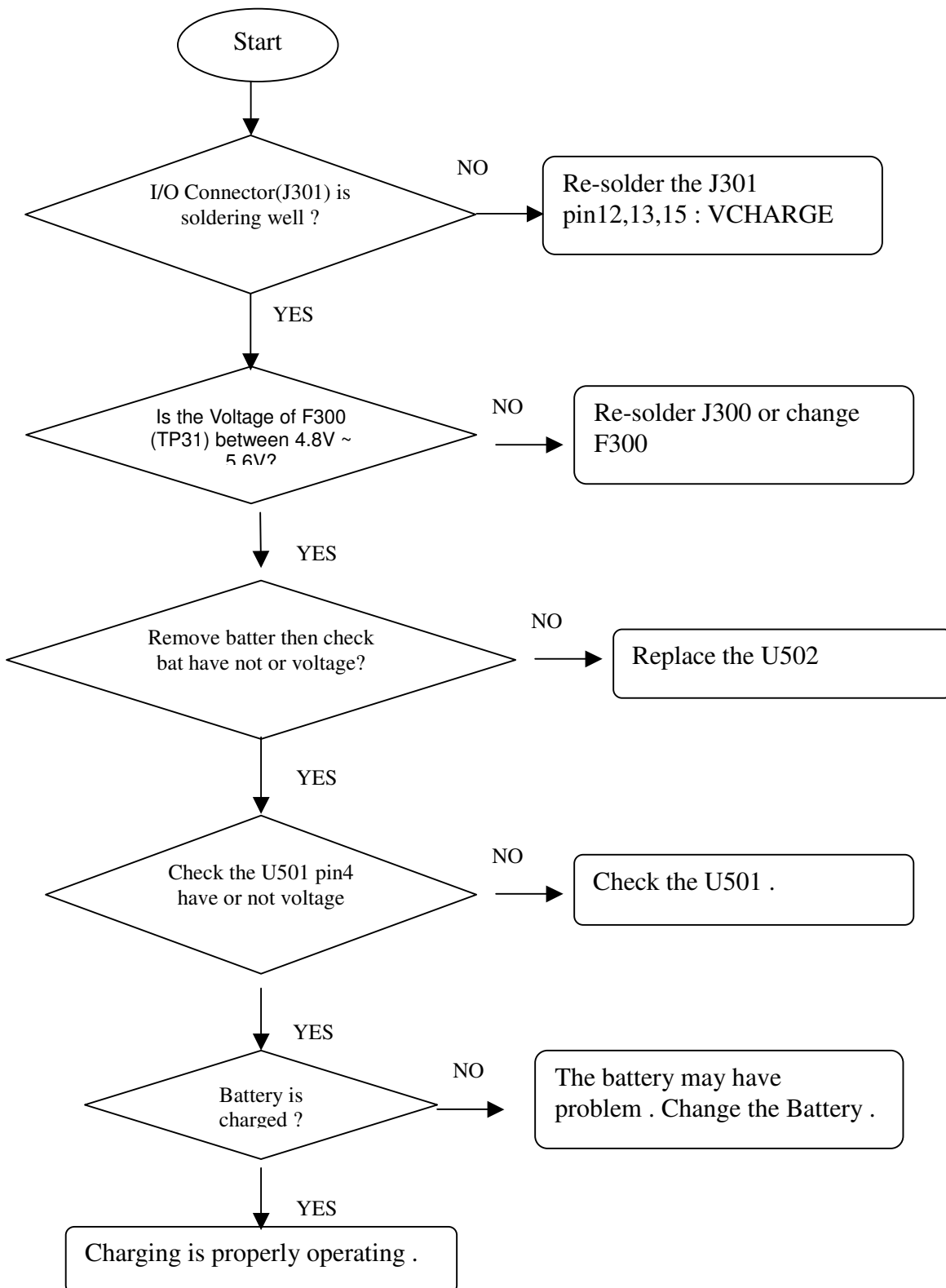
### 4.13.1 Test Point



### 4.13.2 Circuit Diagram

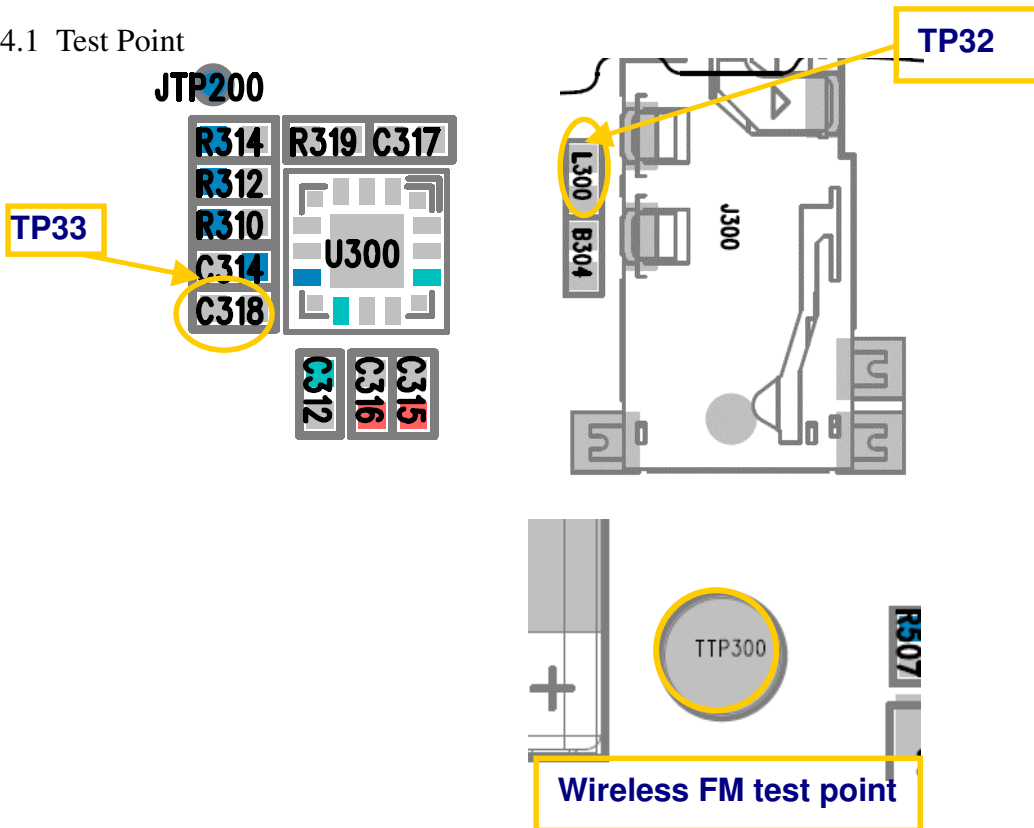


#### 4.13.3 Checking Flow

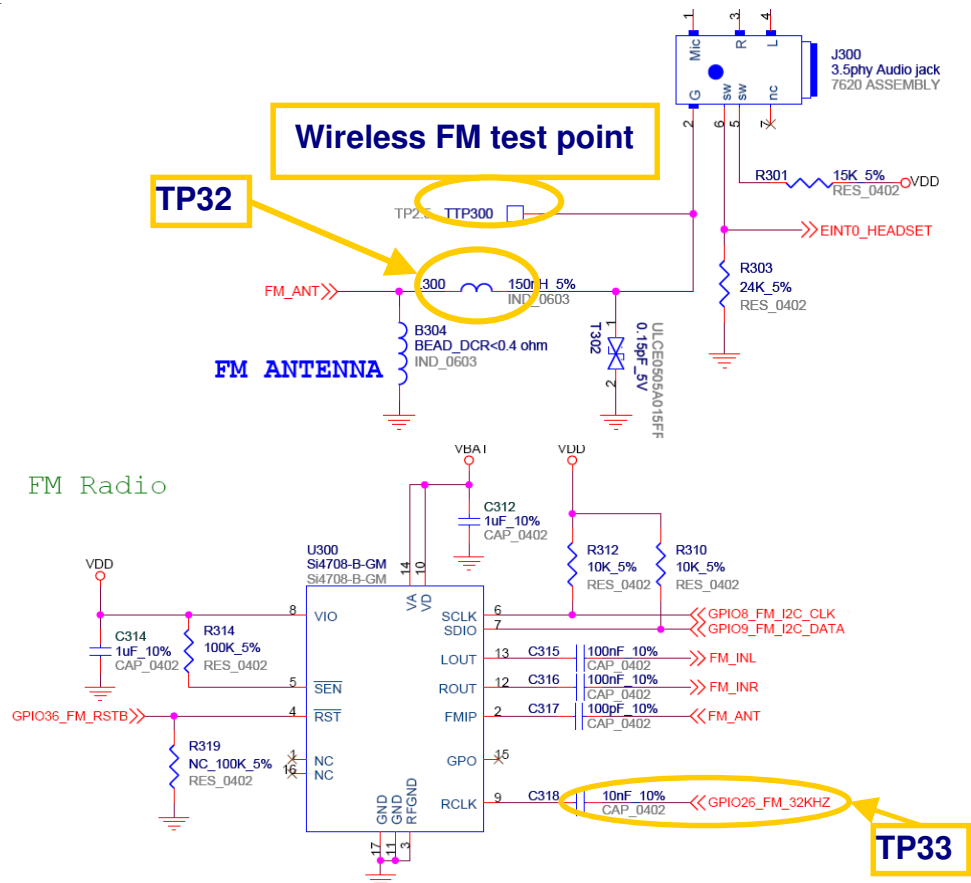


## 4.14 FM Radio Trouble

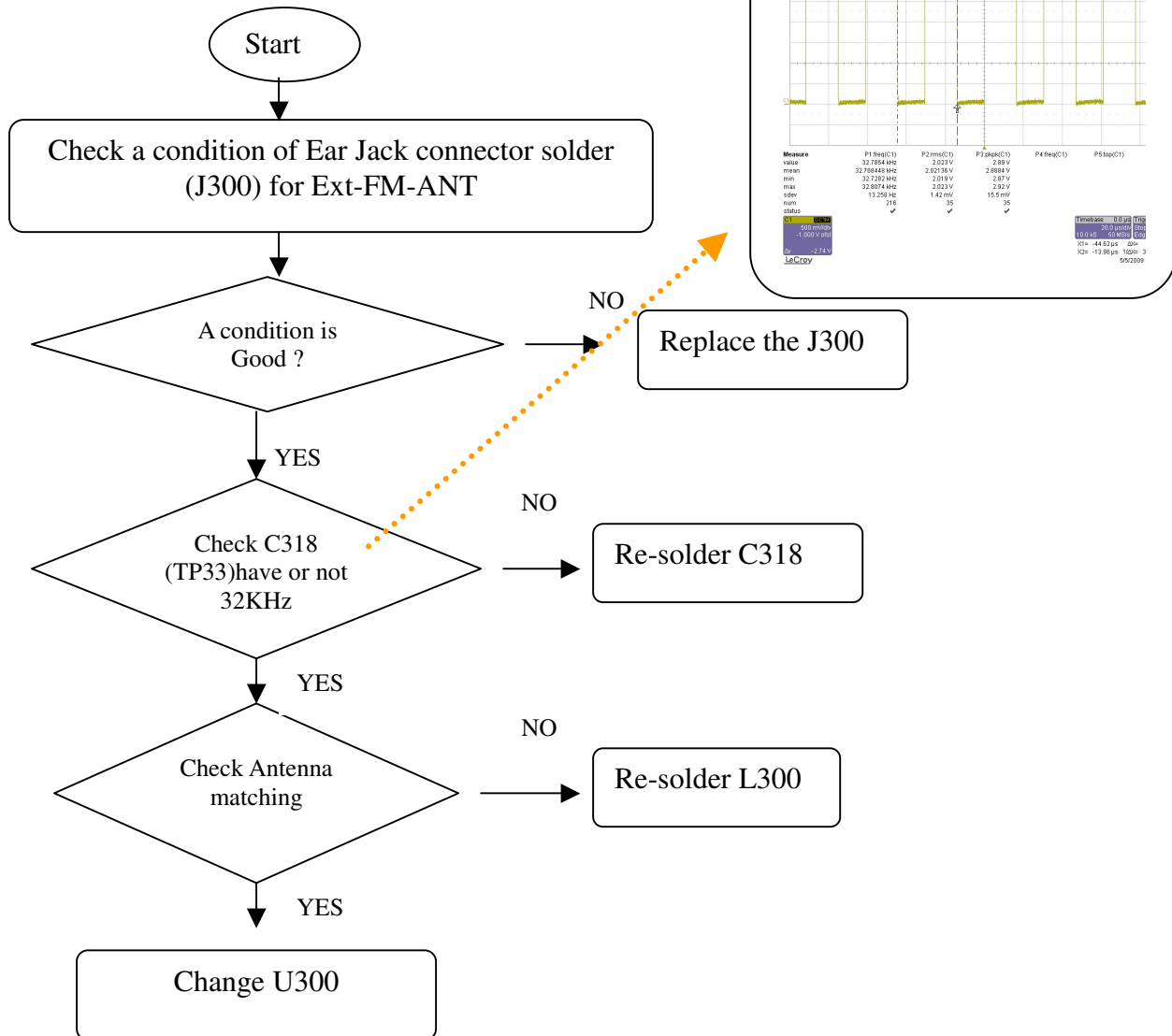
### 4.14.1 Test Point



### 4.14.2 Circuit Diagram



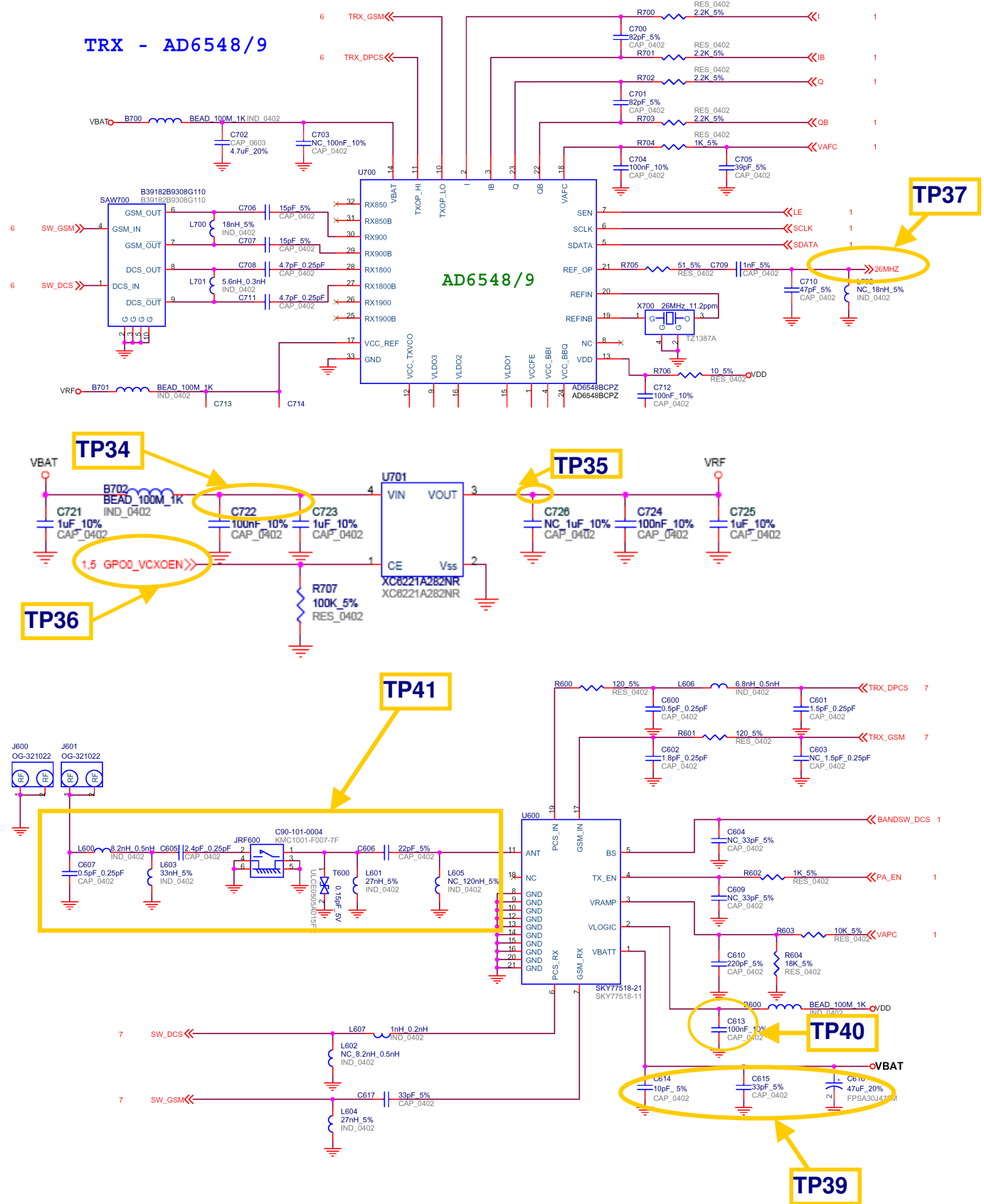
#### 4.14.3 Checking Flow



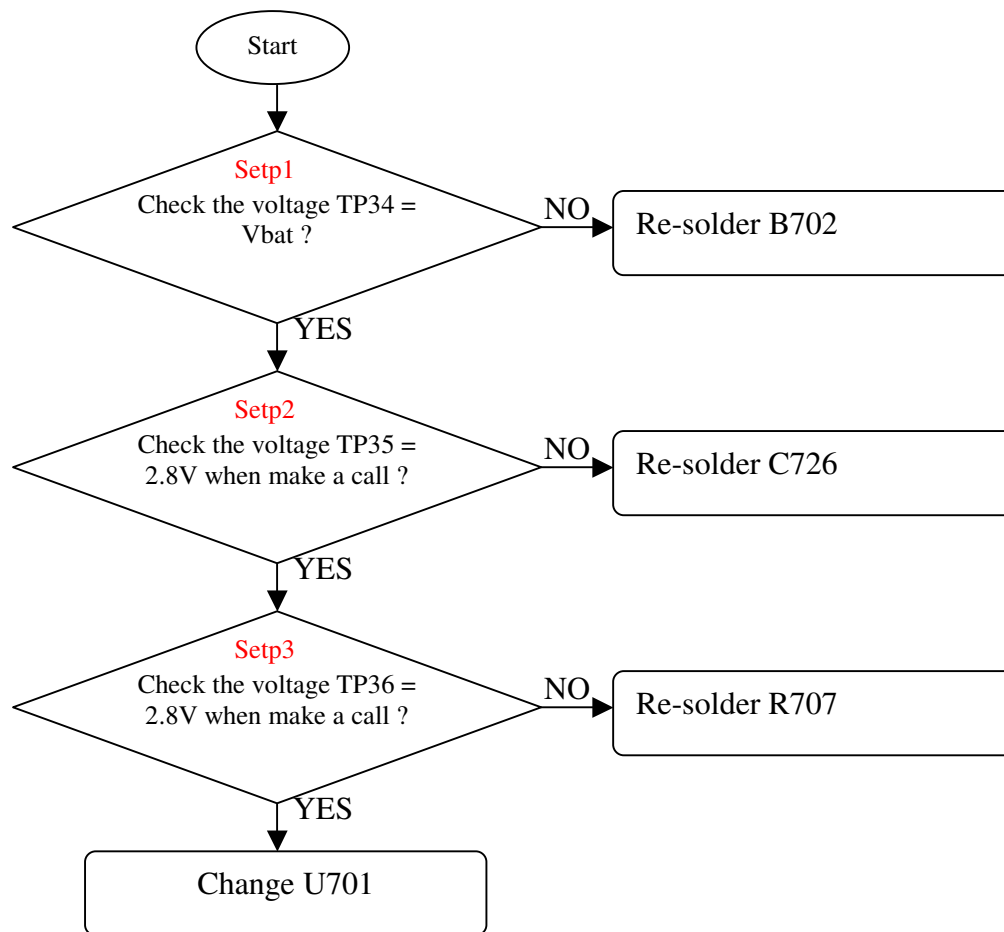
#### 4.15.1 Test Point



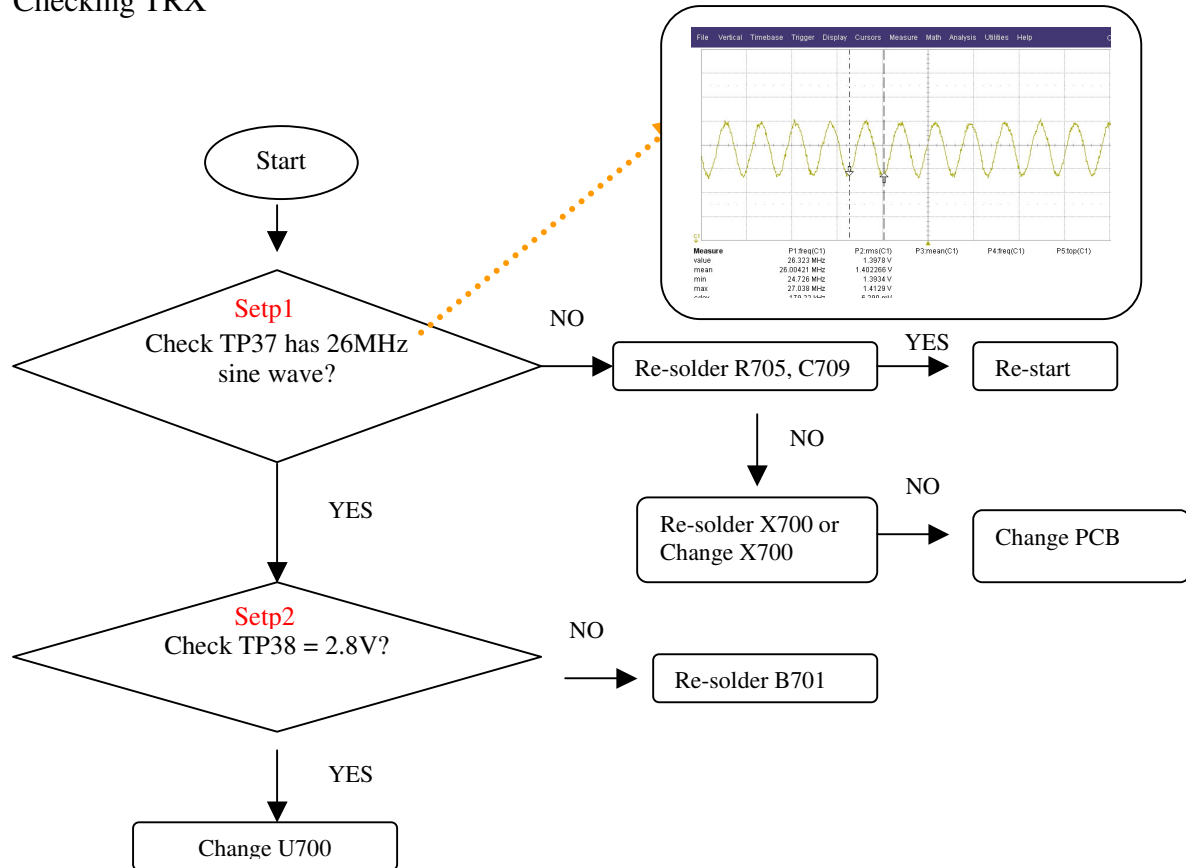
## 4.15.2 Circuit Diagram



#### 4.15.3 Checking TRX LDO

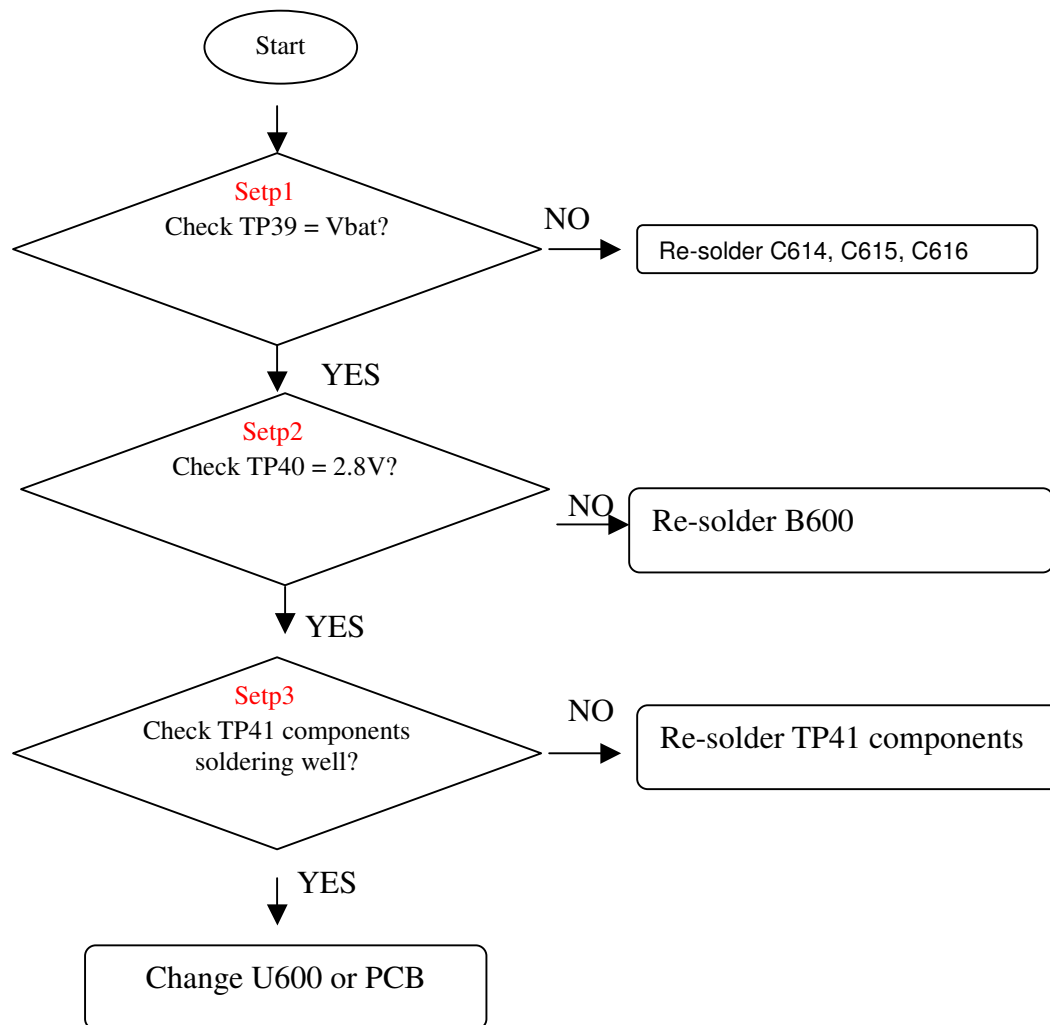


#### 4.15.4 Checking TRX



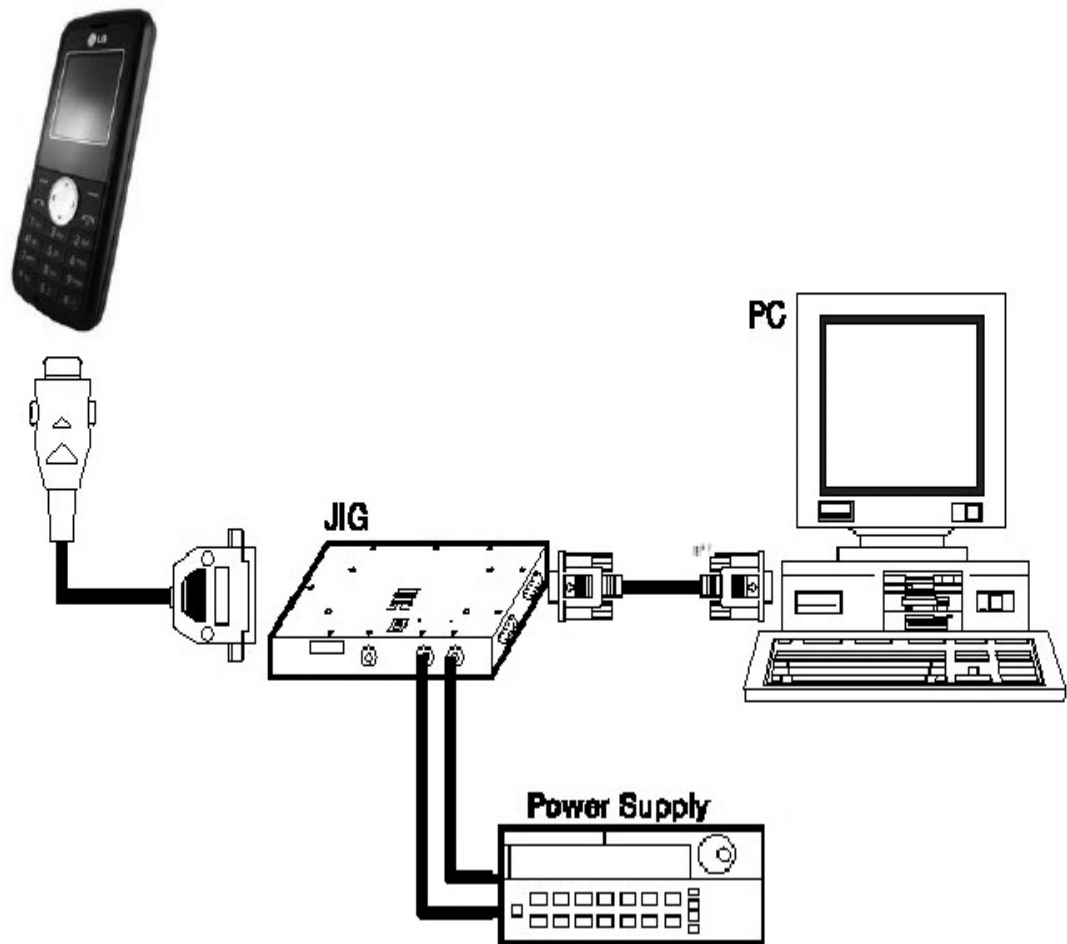


#### 4.15.5 Checking PAM



## 5.DOWNLOAD

### 5.1 Download setup



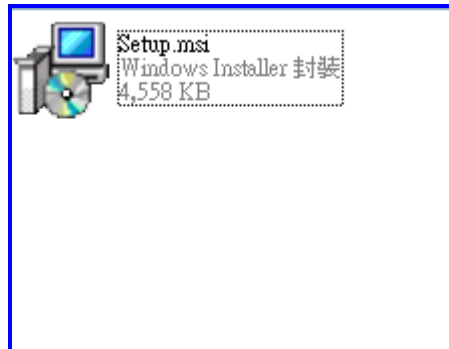
## 5.2 LEO Download Tool

### Tools

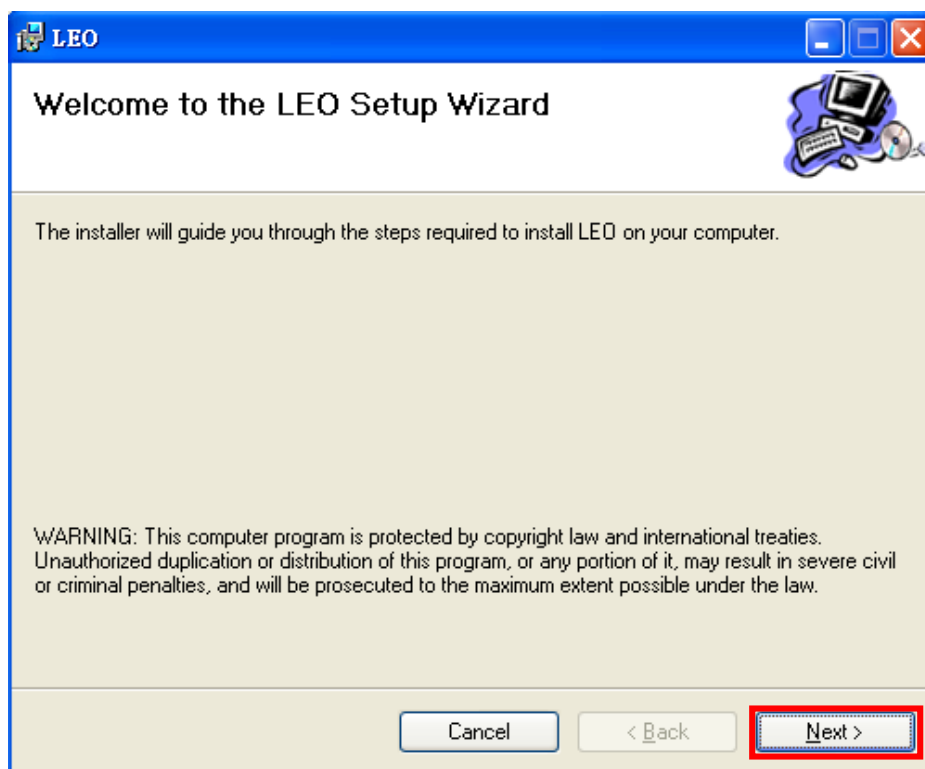
1. Download cable(**Prolific USB-to-Serial**)
2. PC
3. Battery (3.8 V Li-ion Battery)

### How to installation Leo download tool

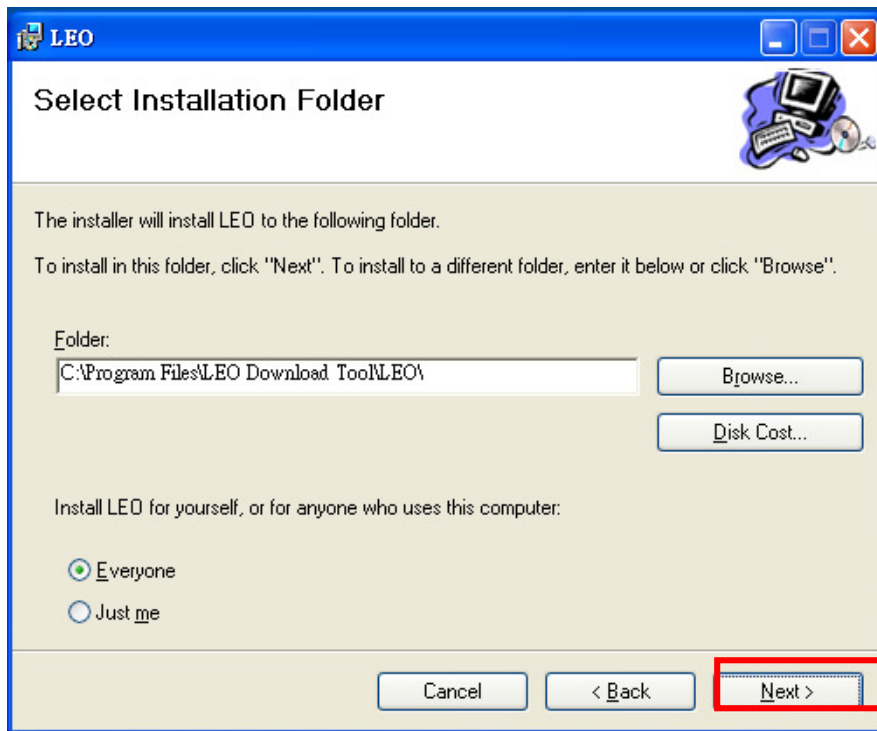
1. You must install “Prolific USB-to-Serial Comm Port” driver first before installing this program, and then double click the “Setup.msi” start installation.



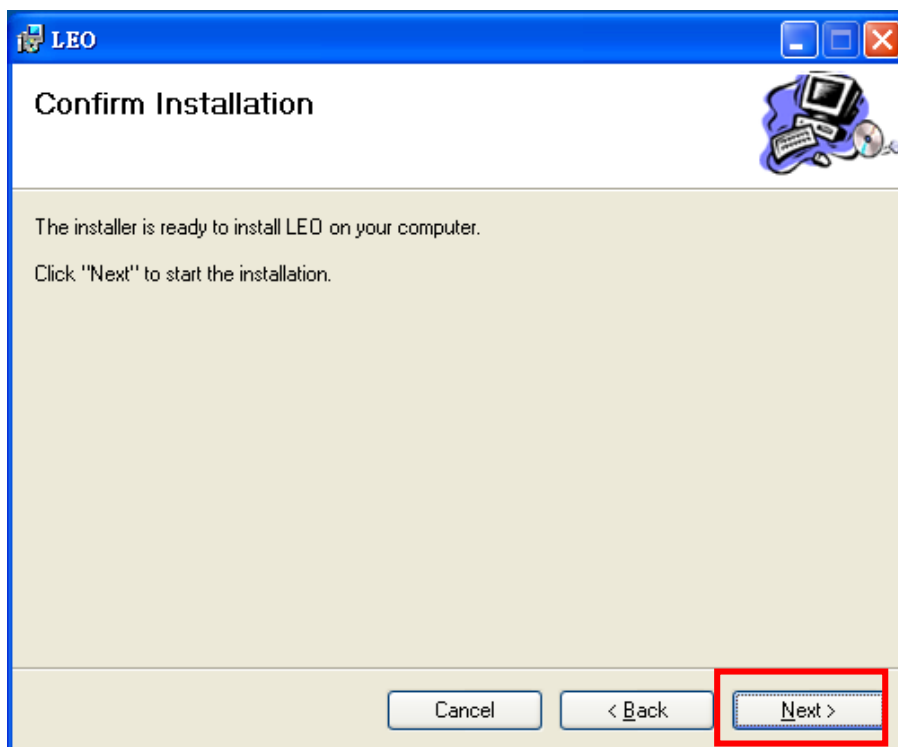
2. You can see the below picture, and then click the “Next” button.



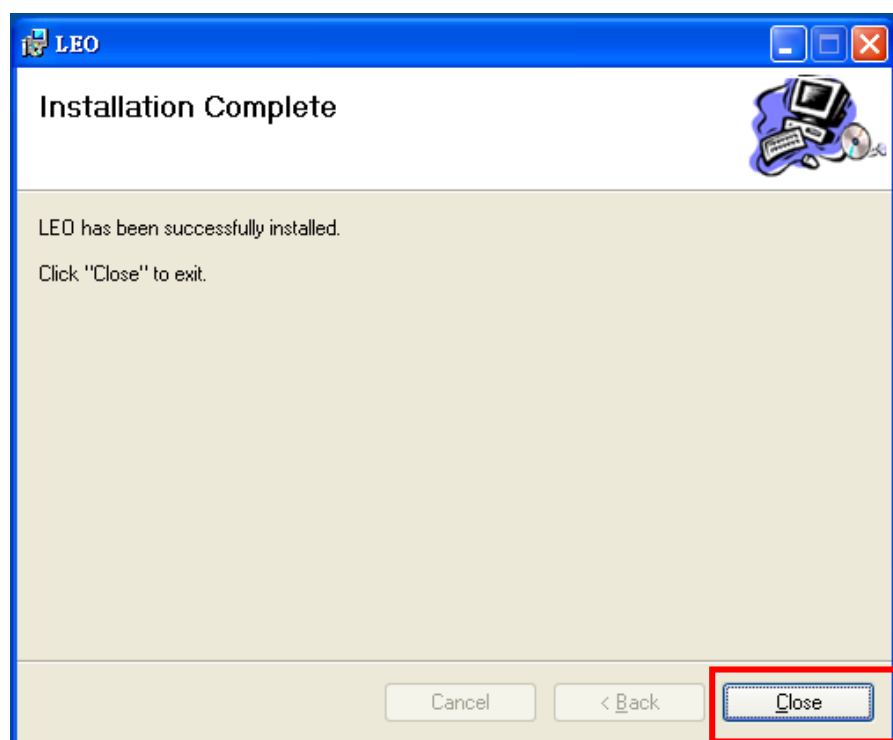
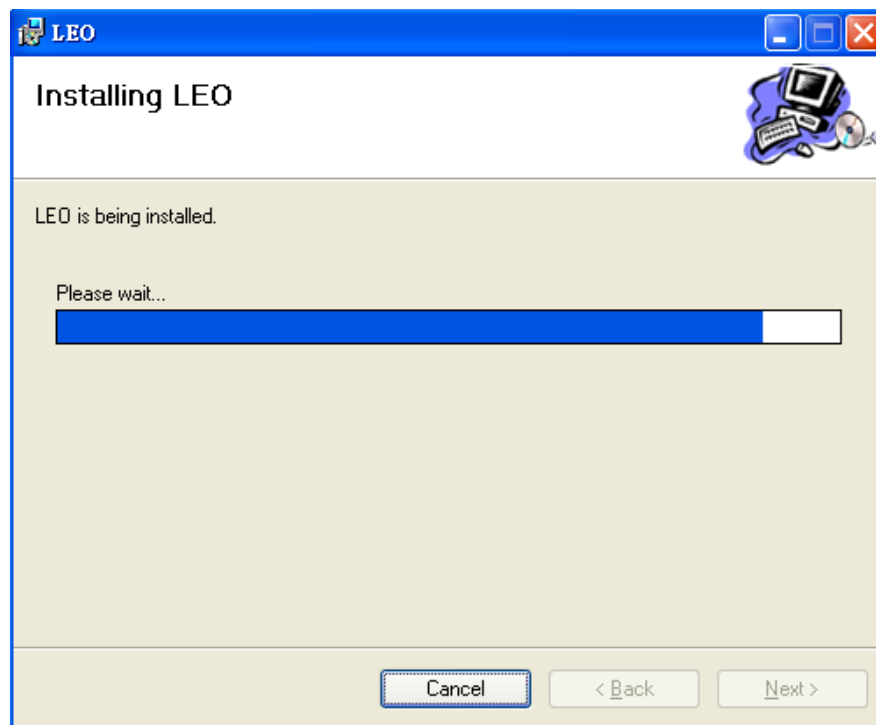
3. You can see the below picture, and then click the “Next” button.



4. You can see the below picture, and then click the “Next” button.



5. You can see the below Installing picture, and then click the “Close” button installation complete.



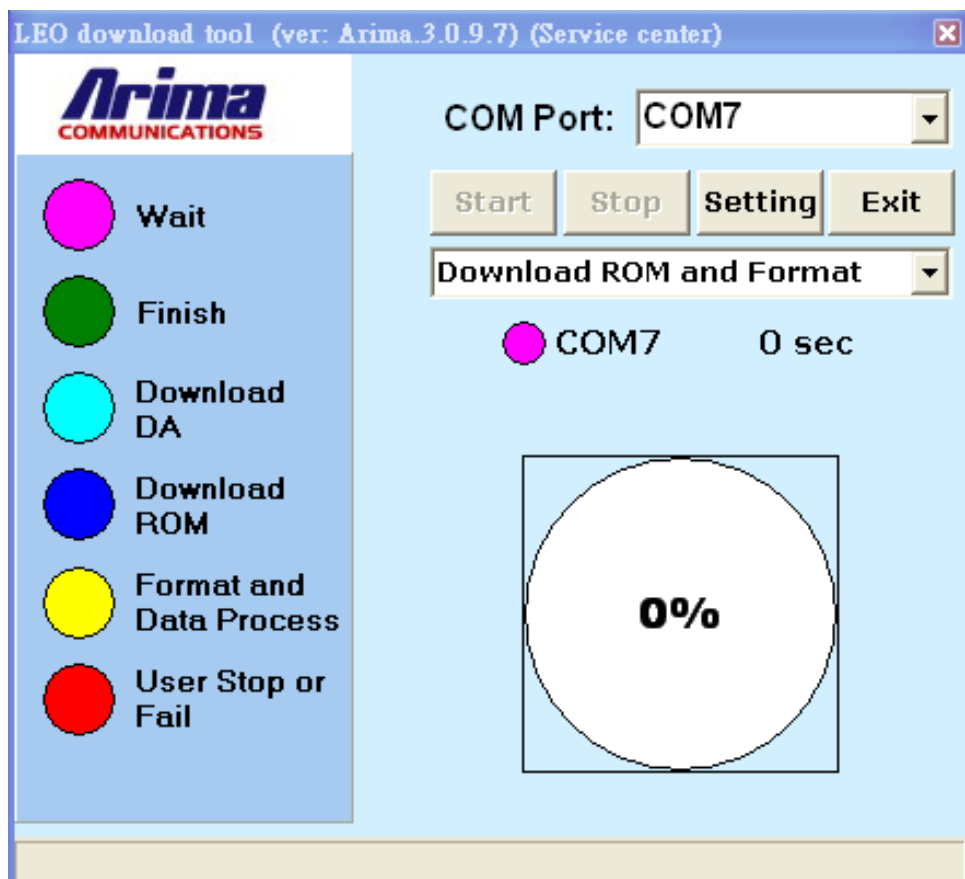
## How to user Leo download tool

**For example:** GB170-00-V09a-CIS-XX-JUN-08-2009

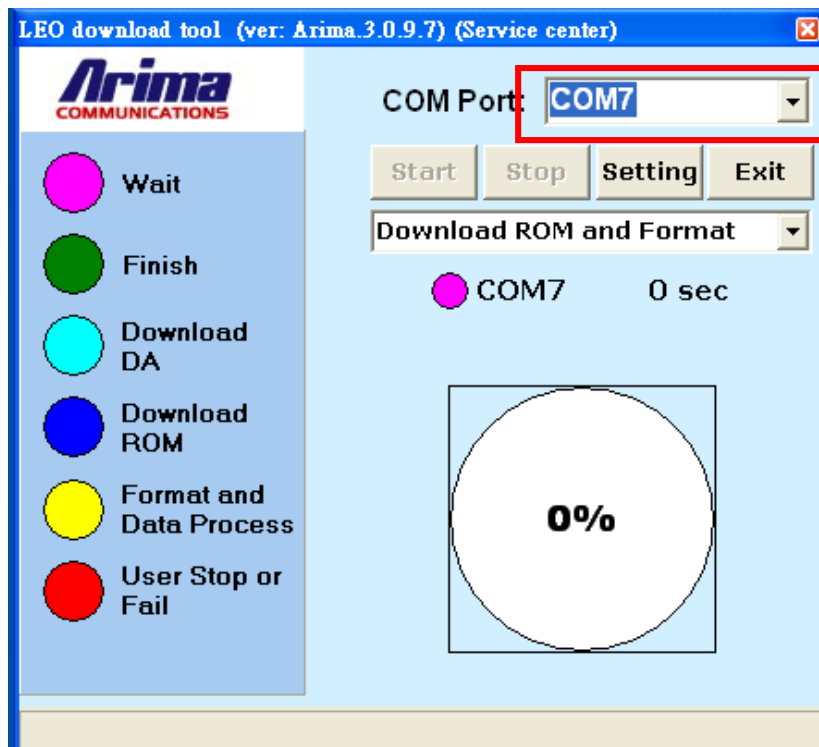
1.Connect Download cable with computer, and then double click the” **LEO Download Tool**”.



2.you can see the below picture.



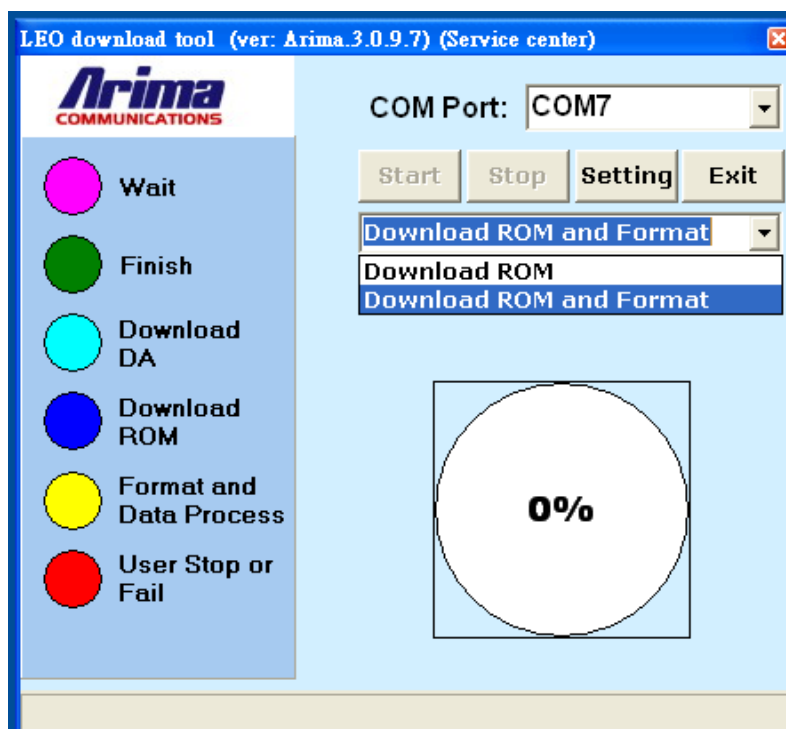
3. Select COM port (LEO will auto detect COM port)



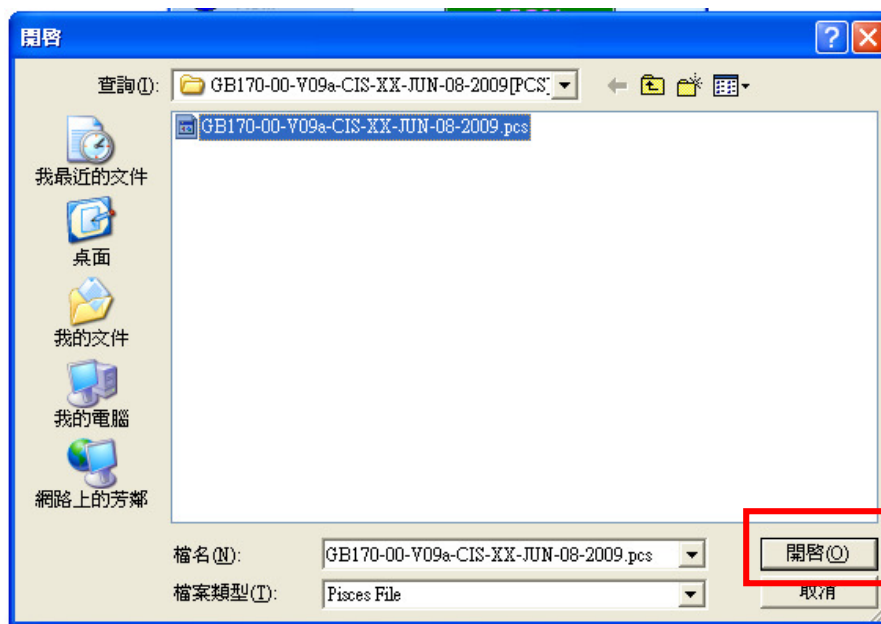
4. Select Download mode.

**Note:**① If you select “**Download ROM**”, it will download software only.

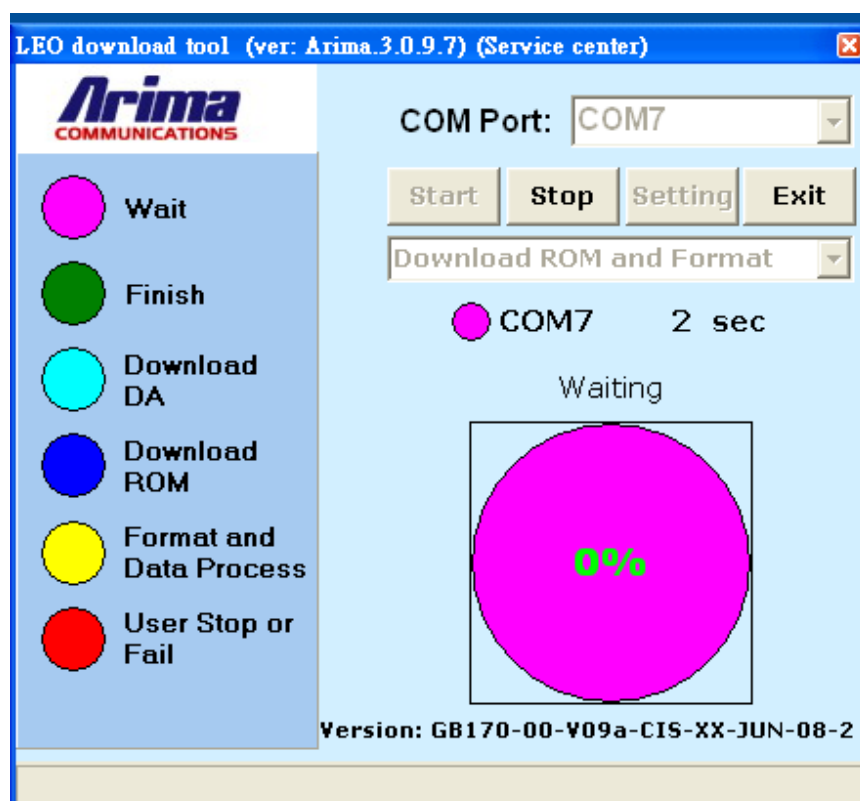
② If you select “**Download ROM and Format**”, it will download software and delete NVRAM all data except calibration data and IMEI number, and delete user disk data include contact information 、 message etc, also it still will reset META\_NVRAM to factory default.



5.Click the “Setting” button and select a valid file. The file always be end of “.PCS” , reference below picture.

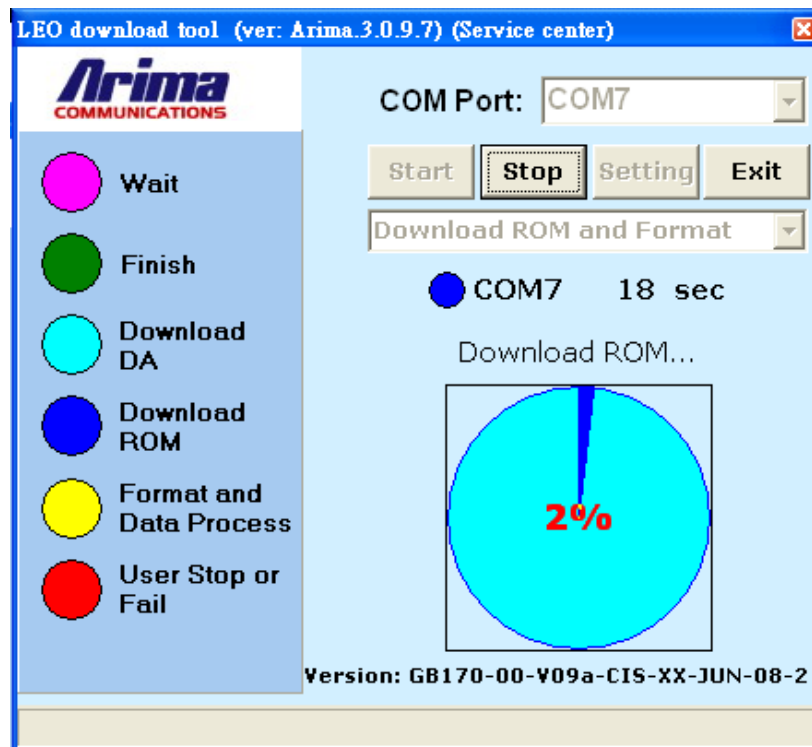


6.Select the “. PCS “file and press open, you can see following picture.

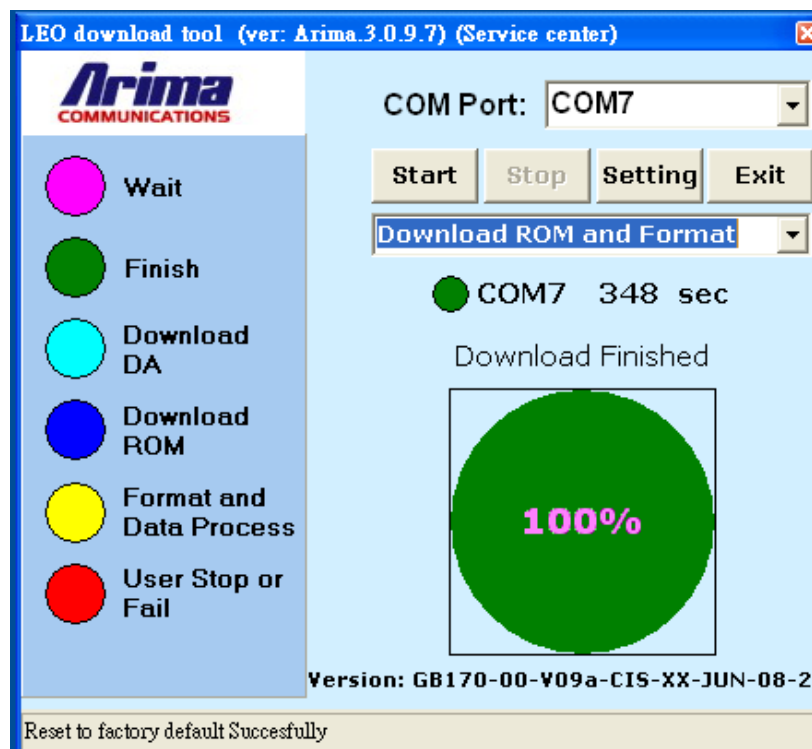




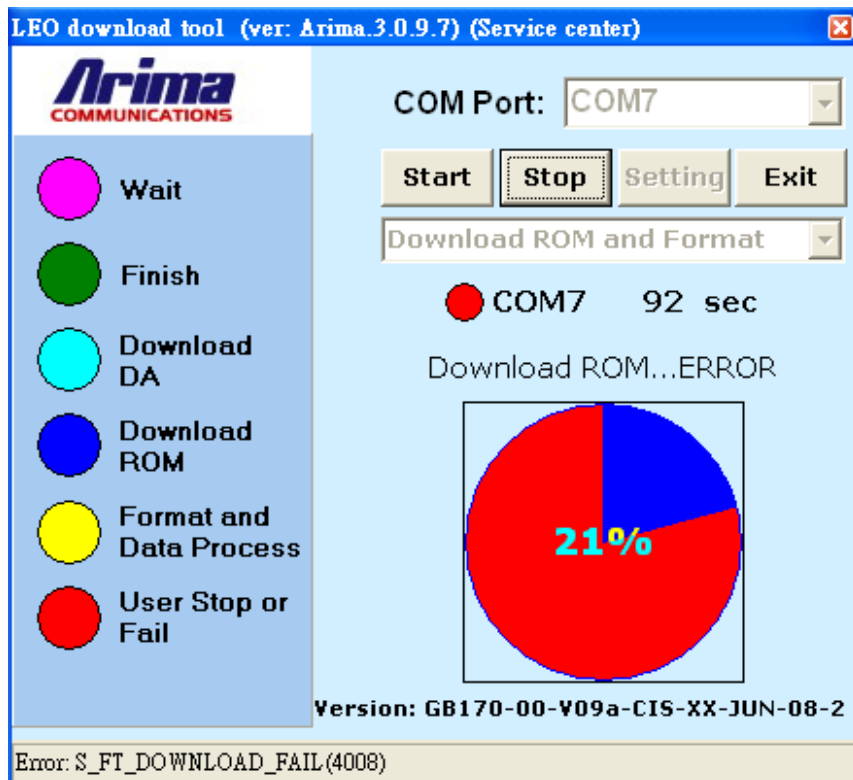
7. After you see the pink cycle, connect download cable with handset, and then press the power key, you will see below picture.



8. After reach to 100%, SW download finish.

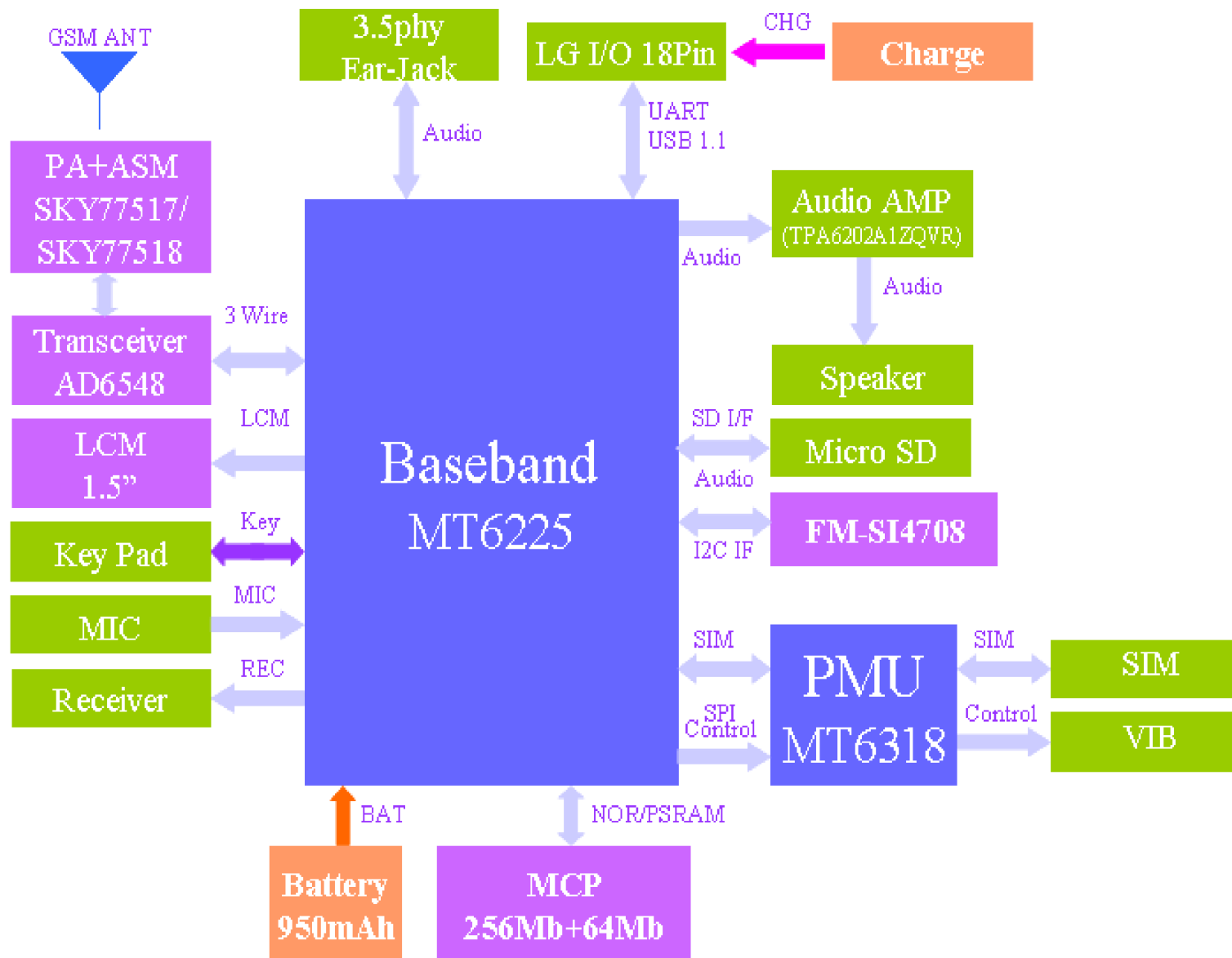


9.If download failed, you will see the below picture.

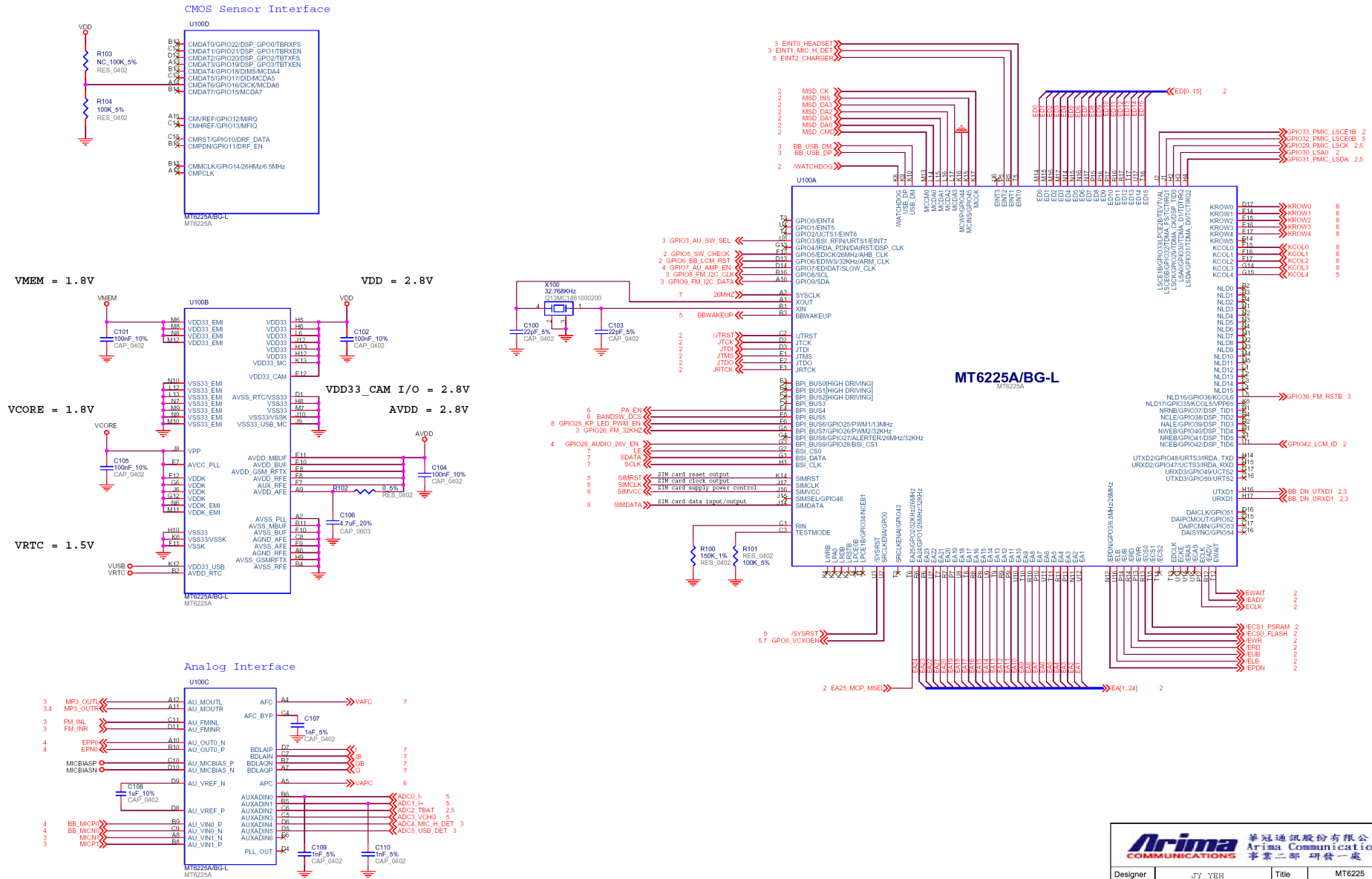


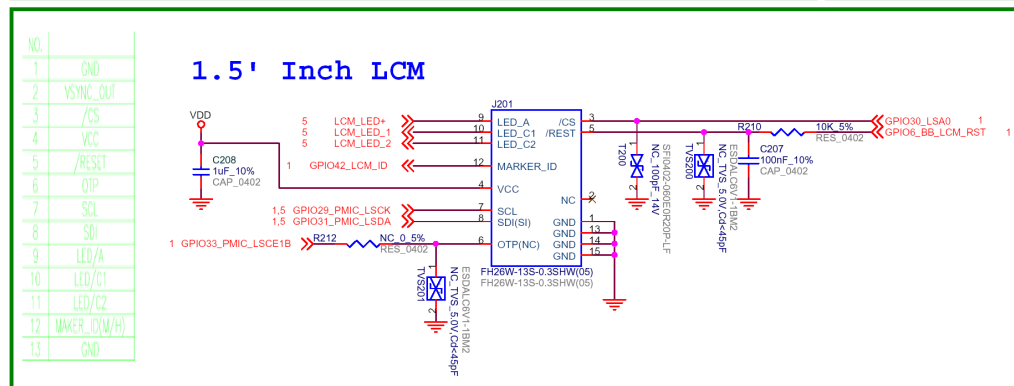
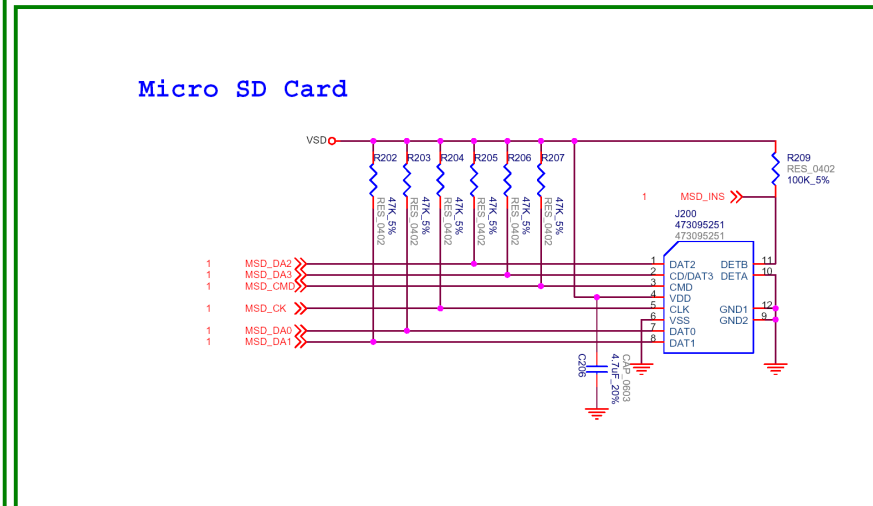
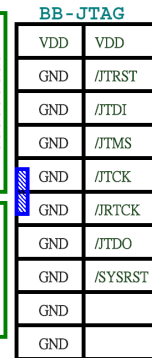
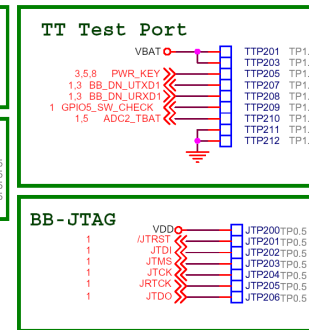
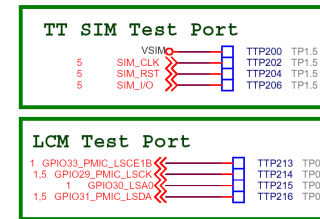
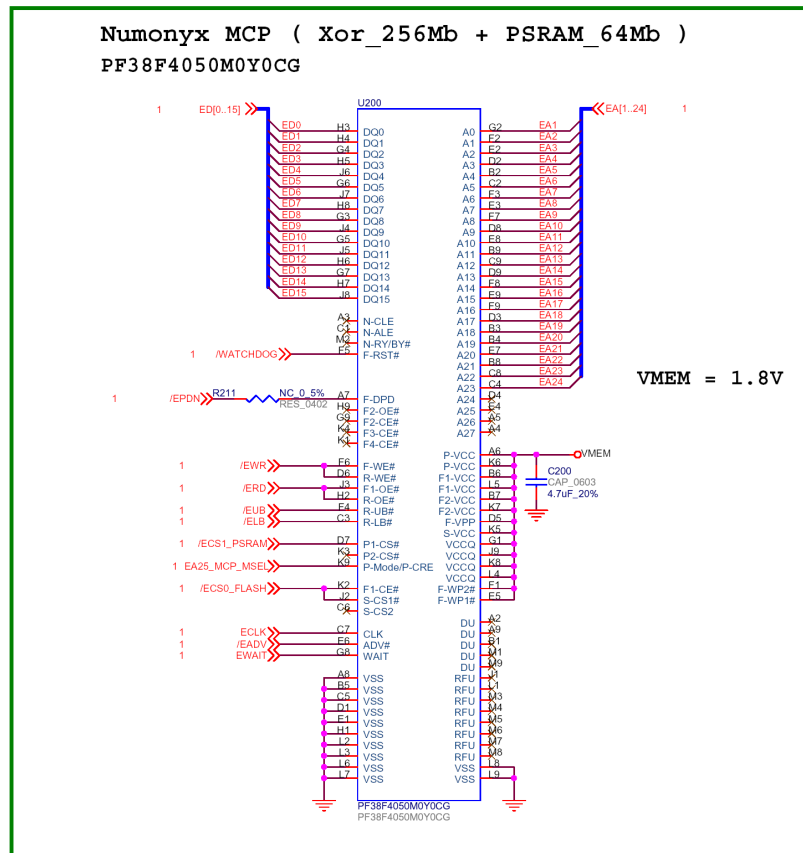
**Attention:** If appear failed image, Please try close LEO and try open again.

## 6. BLOCK DIAGRAM



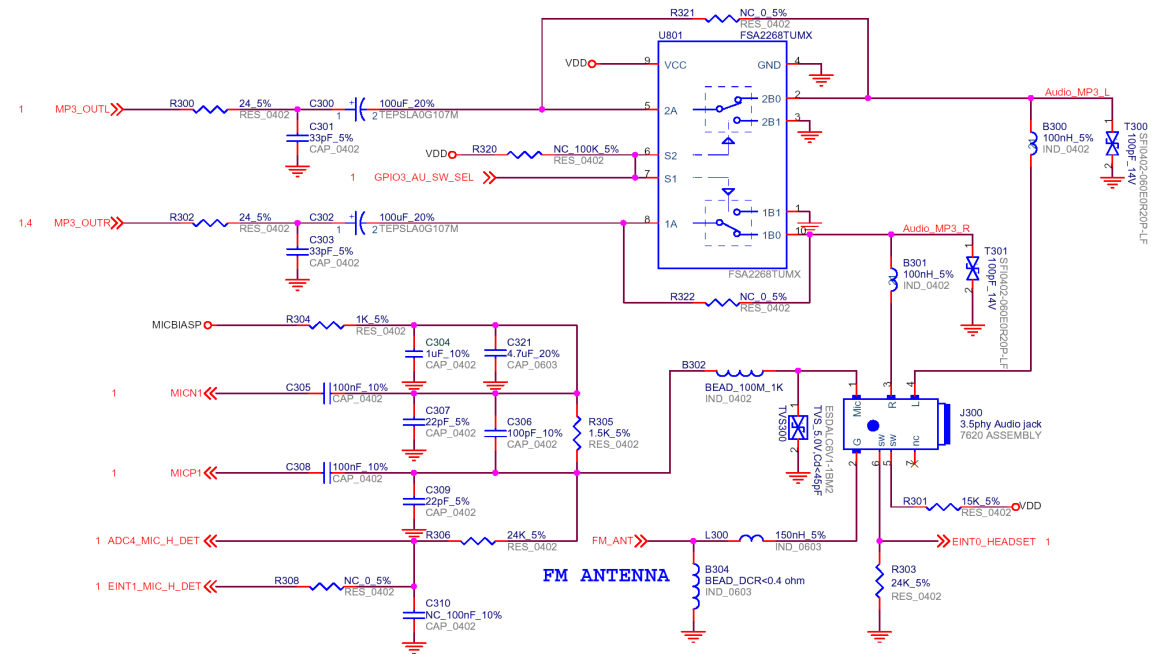
## 7. CIRCUIT DIAGRMA



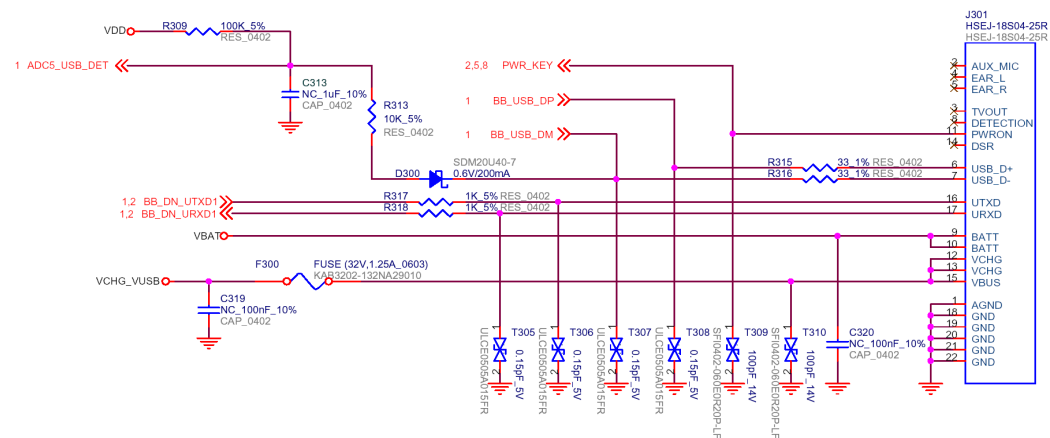


|   |         |          |                         |
|---|---------|----------|-------------------------|
| <b>Arima</b> 華冠通訊股份有限公司<br>Arima Communications Corp. 事業二部 研發一處 |         |          |                         |
| Designer  | JY YEH  | Title    | MCP / LCM / MCSD        |
| Project   | TOPAZ2  | Part No. | <RevCode>               |
| Circuit No.   | V1.5    | Date     | Thursday, July 09, 2009 |
| Sheet   | 2 of 10 | DCC Ver  | Approval                |

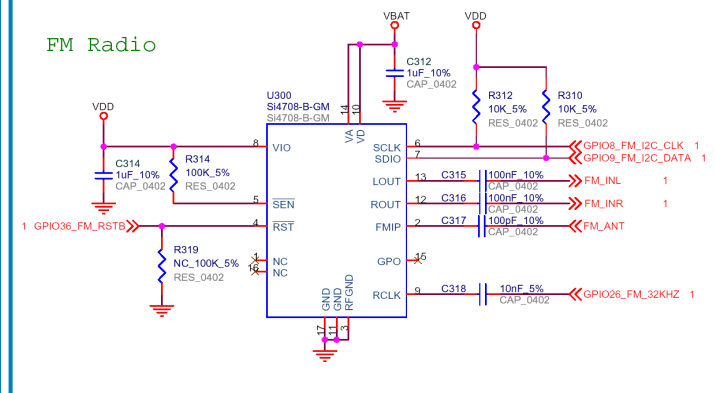
3.5 phy Audio Jack Connect



LG Connect Jack



FM Radio



|  |          |          |                           |
|--|----------|----------|---------------------------|
| <b>Arima</b> 華冠通訊股份有限公司<br>Arima Communications Corp 事業二部 研發一處 |          |          |                           |
| Designer   | JY YEH   | Title    | LG IO / Ear-Jack / SI4708 |
| Project  | TOPAZ II | Part No. | <RevCode>                 |
| Circuit No.  | V1.5     | Date     | Thursday, July 09, 2009   |

### AUDIO AMP

The schematic diagram illustrates an audio amplifier circuit. The input signals are PMU\_SPK+ (pin 2) and PMU\_SPK- (pin 2). The op-amp, TPA6202A1ZQVPR, is configured with a shutdown bypass network (R401, R402, C402, C403, C404, C405) and a feedback network (R403, R404). The output of the op-amp (pin 1) is connected to a speaker (J400) through a series of capacitors (C406, C407, C408) and a resistor (R409). The speaker is labeled 'Speaker\_EMS1813VFR8 EMS1813VFR6P'.

[illegible]

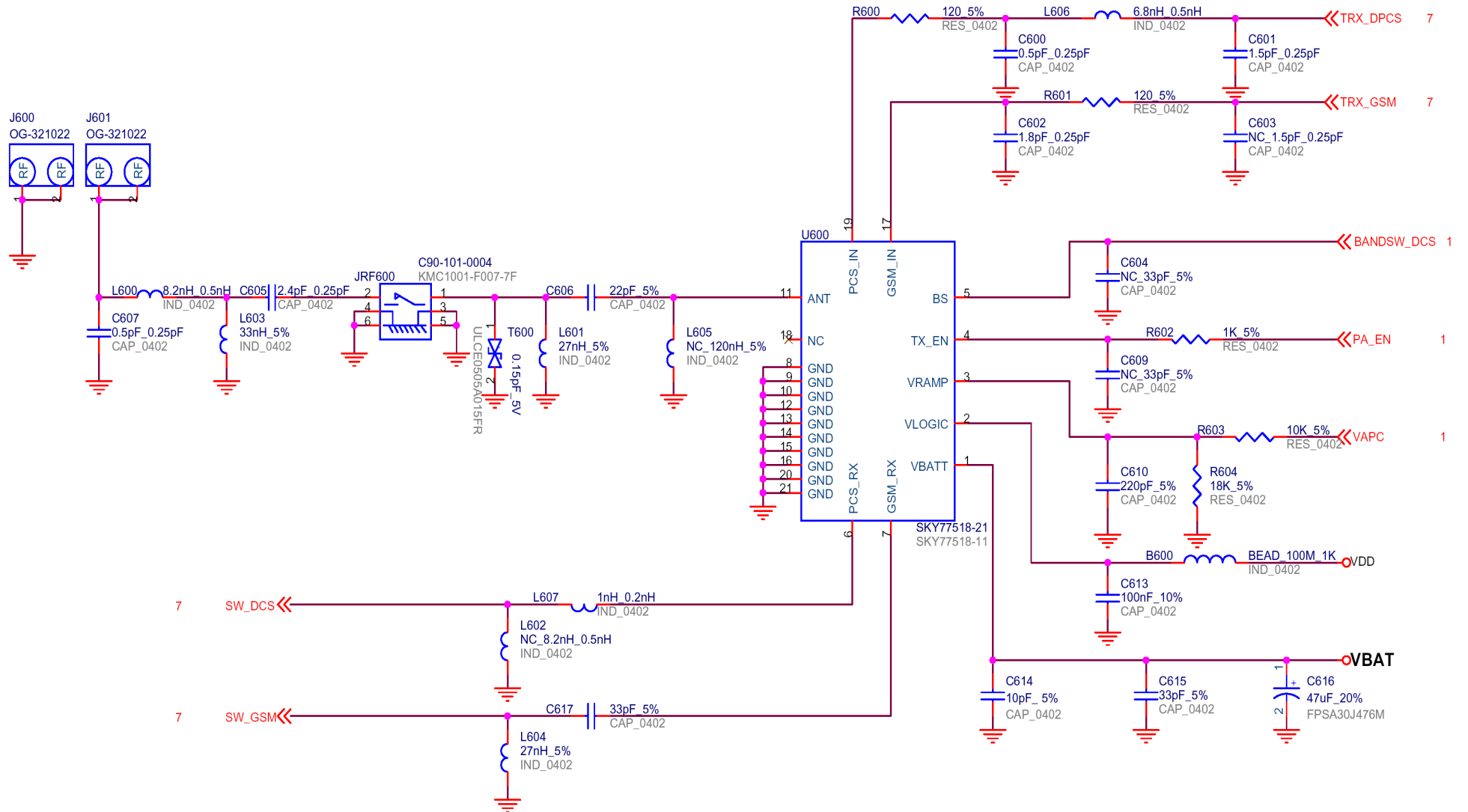
### RECEIVER

The receiver circuit schematic shows two input lines, EPP1 and EPN1, each with a 1-pF capacitor (C414, C416) to ground. EPP1 has a 100-nH inductor (L303) and EPN1 has a 100-nH inductor (L304) in series. Both lines then pass through a TVS diode (TVS402, TVS403) to ground. The signals are then connected to an SD-1206DS-1 receiver chip (J401).

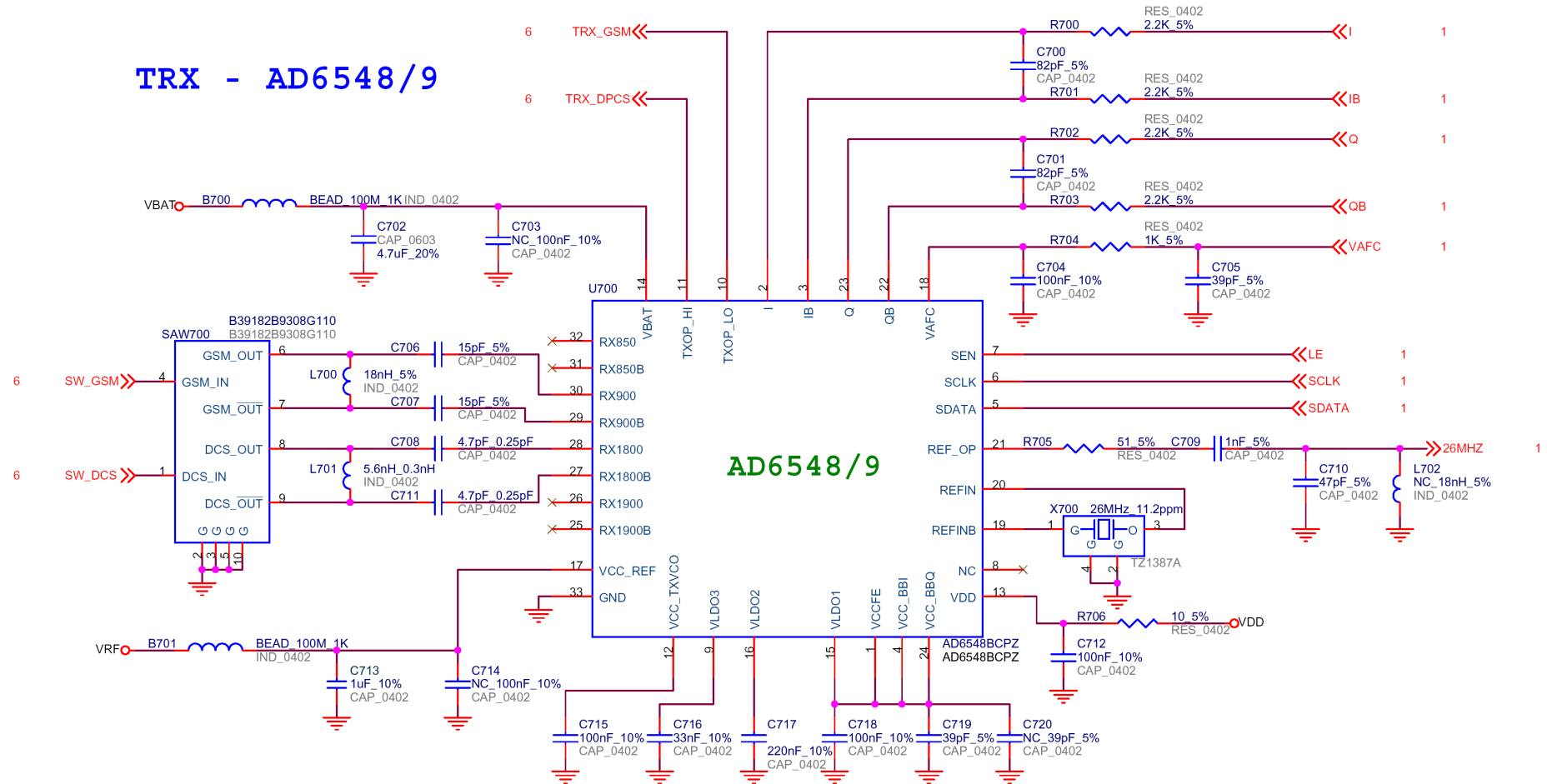




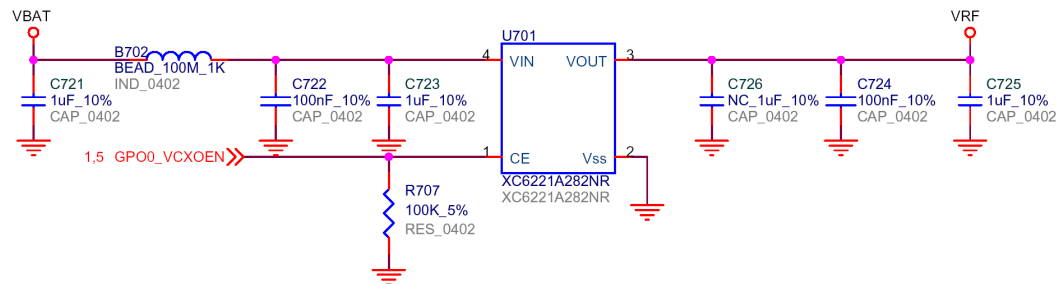
# RF FEM



## TRX - AD6548/9

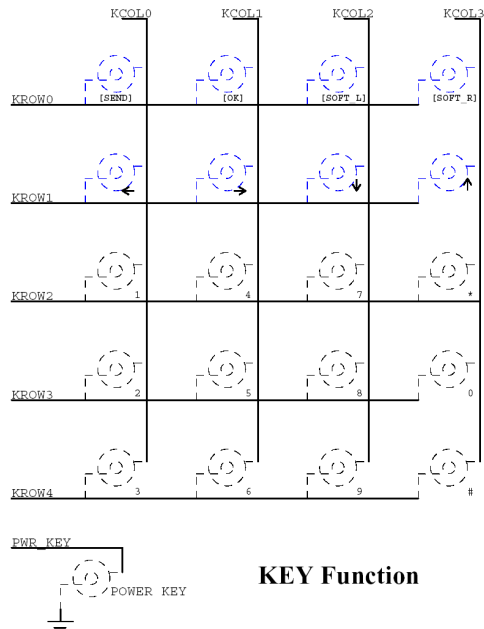


## TRX POWER

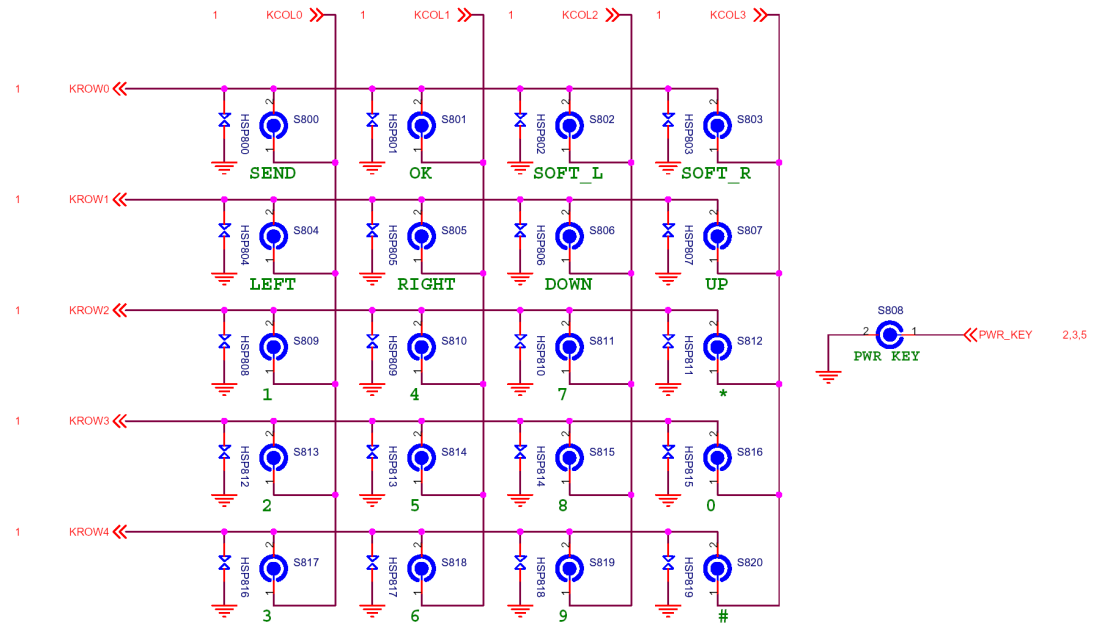


|   |          |          |                         |
|---|----------|----------|-------------------------|
| <b>Arima</b> 華冠通訊股份有限公司<br>Arima Communications Corp<br>事業二部 研發一處 |          |          |                         |
| Designer  | JY YEH   | Title    | TRX_AD6548              |
| Project   | TOPAZ II | Part No. | <RevCode>               |
| Circuit No.   | V1.5     | Date     | Thursday, July 09, 2009 |
| Sheet   | 7 of 10  | DCC Ver  | Approval                |

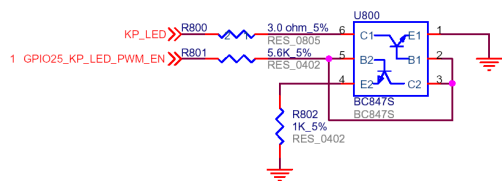
## Key Define



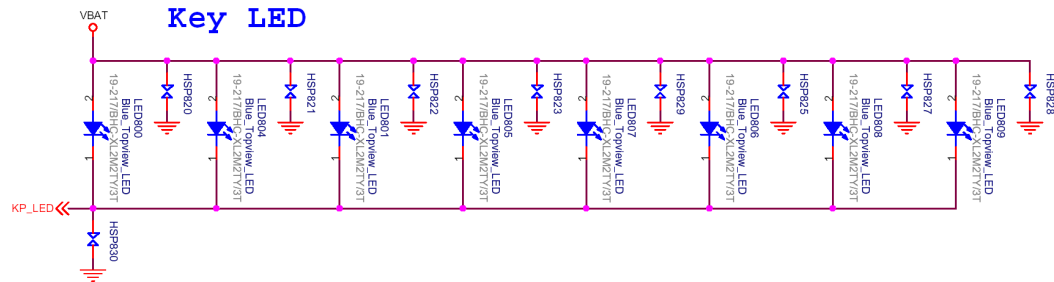
## Key Matrix



## Key Board LED Contorl



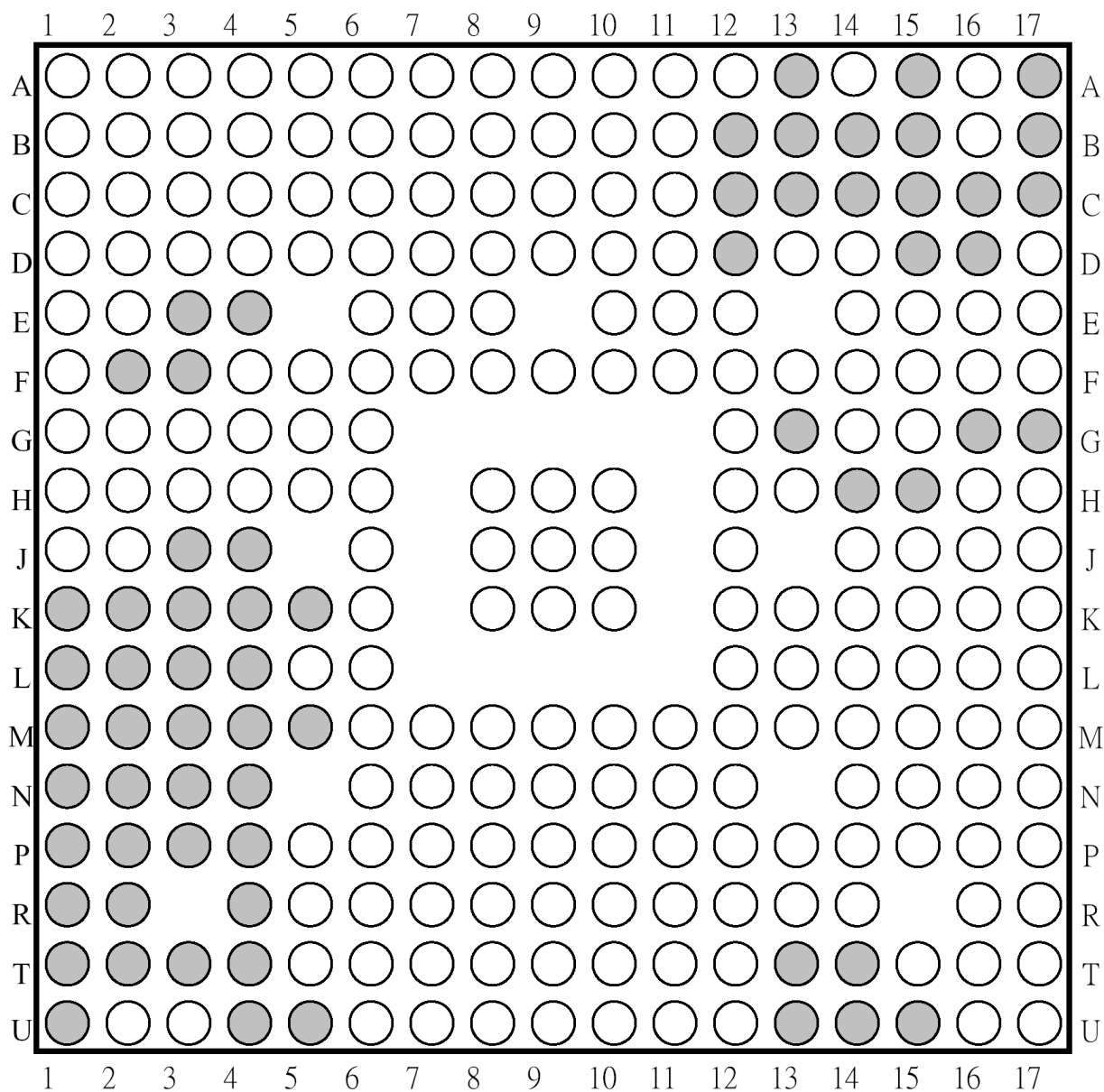
## Key LED



8. BGA IC PIN Check

8.1 BGA PIN Check of main chip (MT6225)

BB\_MT6225 (U100)

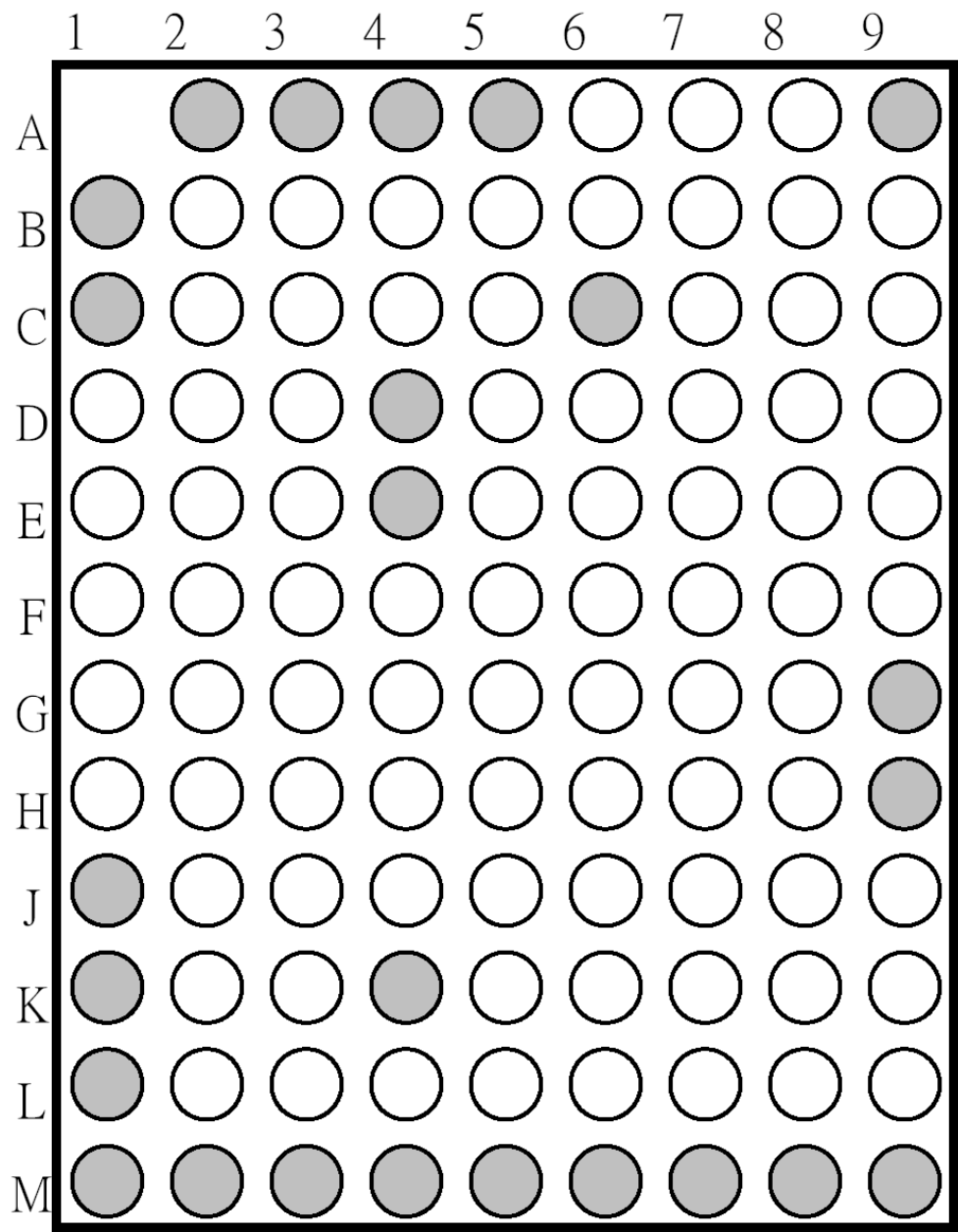


○ BGA use

● BGA non-us

8.2 BGA PIN Check of Memory (PF38F4050M0Y0CG)

PF38F4050M0Y0CG (U200)



○ BGA use

● BGA non-use

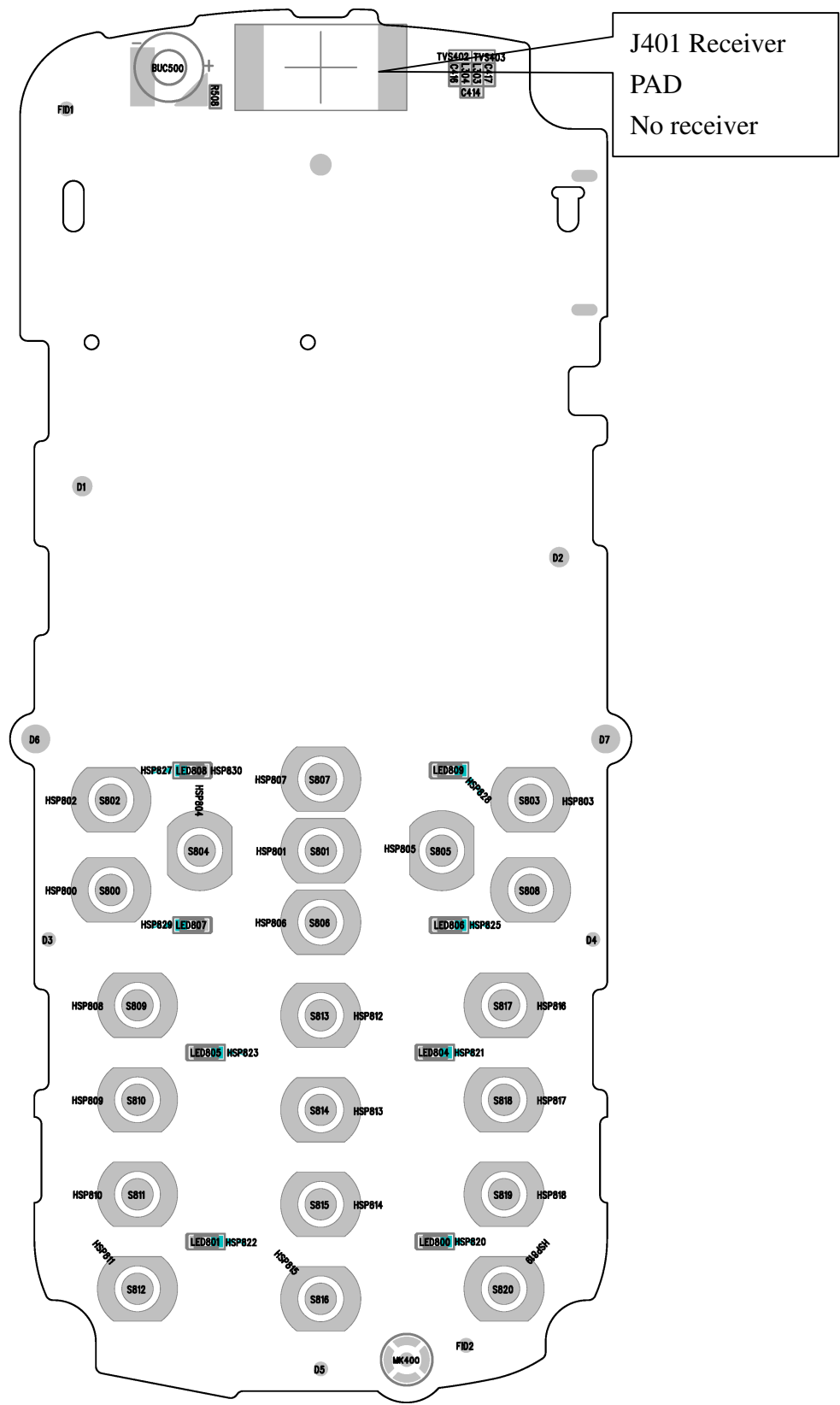
8.3 BGA PIN Check of PMIC (MT6318)

MT6318 (U502)

|   | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|----|
| A |   |   |   |   |   |   |   |   |   |    |
| B |   |   |   |   |   |   |   |   |   |    |
| C |   |   |   |   |   |   |   |   |   |    |
| D |   |   |   |   |   |   |   |   |   |    |
| E |   |   |   |   |   |   |   |   |   |    |
| F |   |   |   |   |   |   |   |   |   |    |
| G |   |   |   |   |   |   |   |   |   |    |
| H |   |   |   |   |   |   |   |   |   |    |
| J |   |   |   |   |   |   |   |   |   |    |
| K |   |   |   |   |   |   |   |   |   |    |

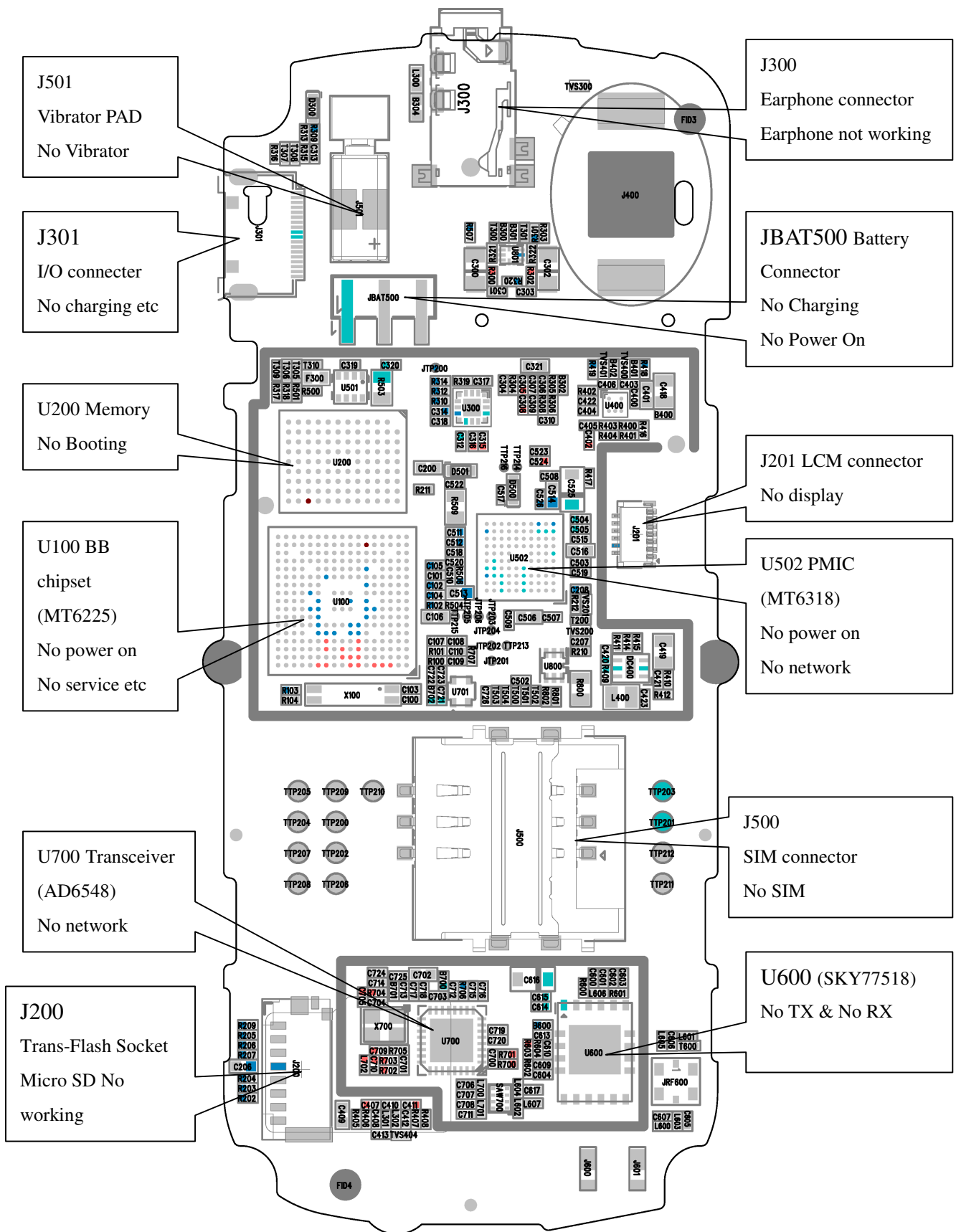
- BGA use
- BGA non-use

9. PCB LAYOUT



J401 Receiver  
PAD  
No receiver

TOP



**Bottom**



# 10.Engineering Mode

## 1. Test purpose

- a) To verify Appearance by visual check
- b) To verify recognition of SIM card
- c) To verify Function Test in the table shown as below
- d) To verify power down phone

## 2. Test System

- 1. Power Supply Unit (PSU)+Dummy Battery or Battery
- 2. Test SIM Card (Spec: GSM Phase 2+ Test SIM Standard 1(3.1))
- 3. Sample Hands free Kit (SHF, Stereo)

## 3. Test Procedure

### 3.1 Appearance Test

Verify appearance by visual check

### 3.2 SIM Test

Verify recognition of SIM card

If “Insert SIM” indicated on Display, it is NG.

### 3.3 Enter Service Mode

#### 3.1.1 No SIM Card installed

- a. Power on Phone
- b. Press **878** to enter service mode.

#### 3.1.2 SIM Card installed

- a. Power on Phone
- b. Press **\*#878#** to enter service mode.

#### 3.1.3 Software Version Check

Select item 8 “Version” in Factory mode to check software version.

## 4 MMI Tests

1. Auto test
2. SHOW, IMEI, BT, SW Version
3. Echo Loop
4. ANTENNA TEST
5. Version
6. Keypad
7. Vibrator
8. Loud Spk
9. Ring Tone
10. LED
11. LCD
12. Receiver
13. ADC
14. Charger
15. Headset
16. RTC
17. MTBF
18. UART
19. Camera
20. Radio

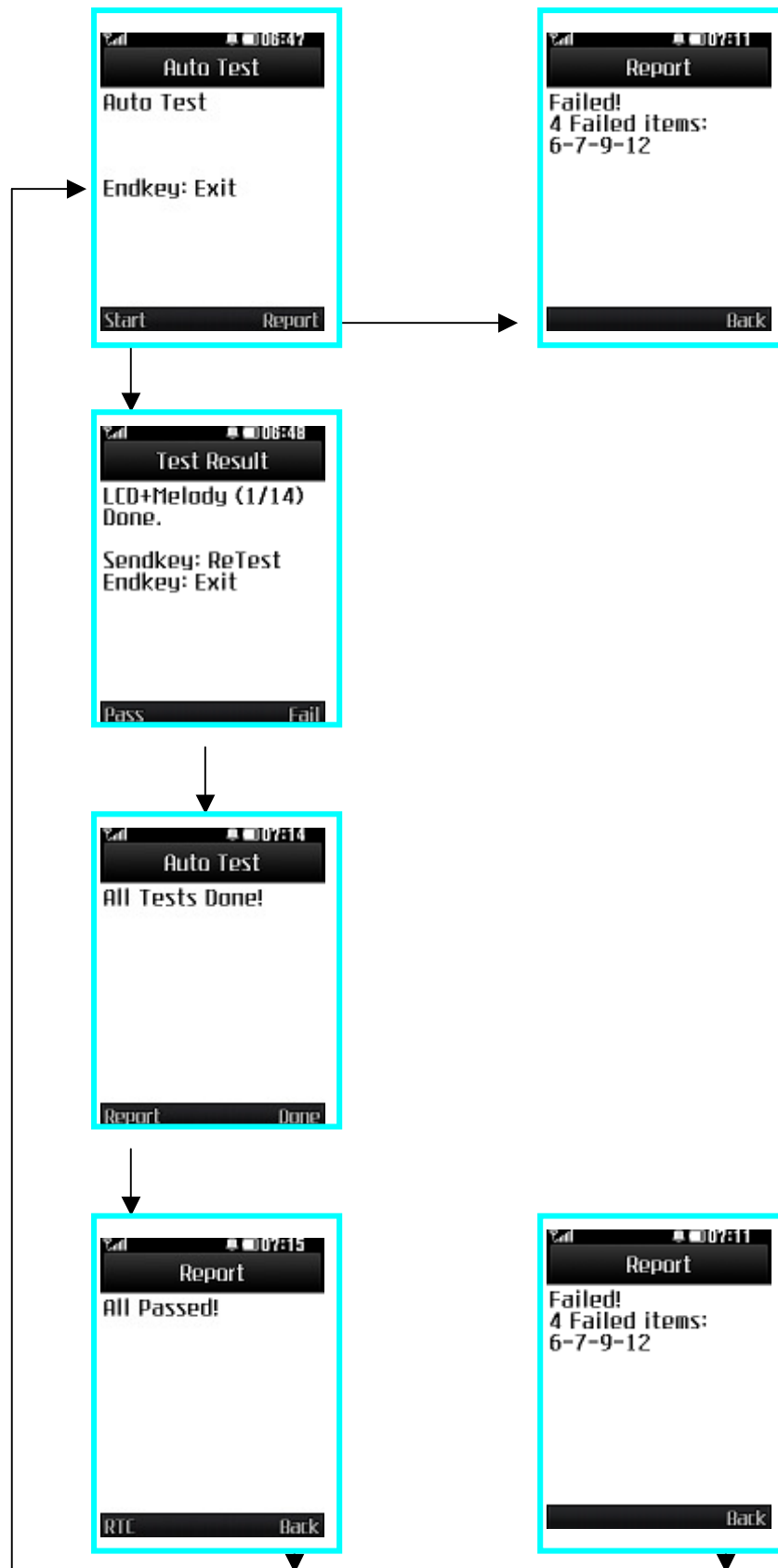
### Auto Test Mode

This auto test mode is designed to do the baseband test automatically. When you finish all tests, phone will report the result for you.

### Enter and Exit Auto Test Mode

In the idle screen, enter “\*#878#” and the Auto Test Mode menu will show up. In Auto Test Mode main menu, press Left-Soft-Key (LSK) “Start” will process the test automatically or End key to go back to the idle screen.

## Work Flow



## **All Auto Test**

LCD+Melody, BackLight+Vib+Flashlight, MIC, KeyPad, RTC, Headset, FM-Radio, AM-Radio, Bluetooth, FM-ADCTemp, NAND, MemoryCard, CAMERA, Antenna

### **1. Charger Test**

Check the charger function is correct or not and charging current.

### **2 .LCD+Melody**

LCD Backlight, LCD pattern and MIDI melody playing.

### **3 .Backlight+Vibrator**

The LCD backlight and keypad backlight with Vibrator on/off on every 0.5sec.

### **4 .MIC**

Enable microphone audio path to pass input sounds to receiver for checking the microphone and receiver component.

### **5 .KeyPad**

Test all keypad keys. All the keys are displayed on the screen. When a key is pressed, the depression is detected and the key disappears from the screen. Once all keys are detected, the test stops and exits.

### **6. Headset**

To test the analog loop back path from headset MIC to headset Receiver.

### **7 .FM-Radio**

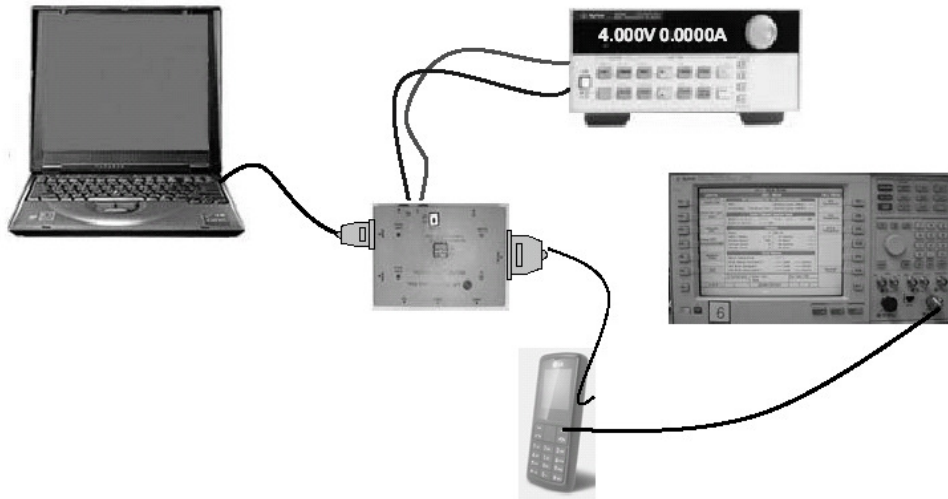
Force FM-Radio to receive FM signal and show the RSSI in 100.7 MHz channel.

### **13.Antenna**

To test the antenna module.

# 11.CALIBRATION

## 11.1 Test Equipment set up



## 11.2 Calibration Steps

### Environment Requirement:

OS:

MS Windows 2000 or XP

Hardware:

Generic Pentium III or above PC (256M RAM or above)

GPIB Card

- National Instruments GPIB device and driver
- Agilent GPIB card and driver
- KEITHLEY GPIB card and driver

Radio Communication Tester

- Rohde & Schwarz CMU 200
- Agilent 8960
- Anritsu MT8820
- Rohde & Schwarz CMD55
- Willtek WT4400
- Agilent N4010A (for Bluetooth test)
- Rohde & Schwarz CBT (for Bluetooth test)
- Anritsu MT88852 (for Bluetooth test)

DC Power Supply

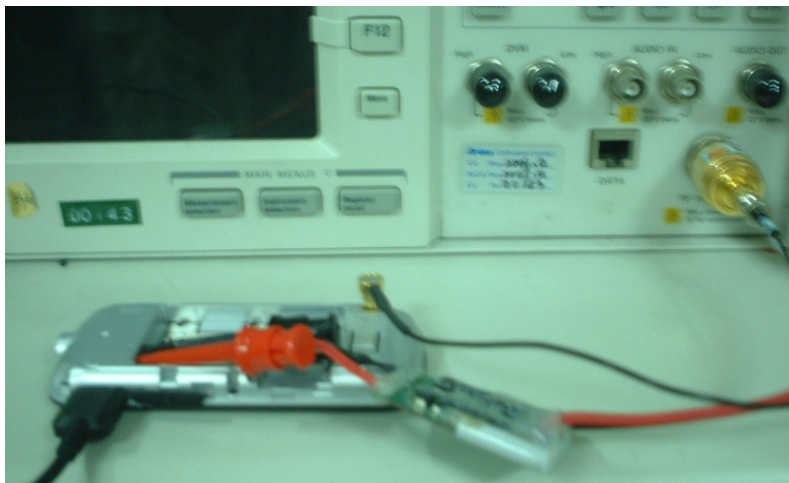
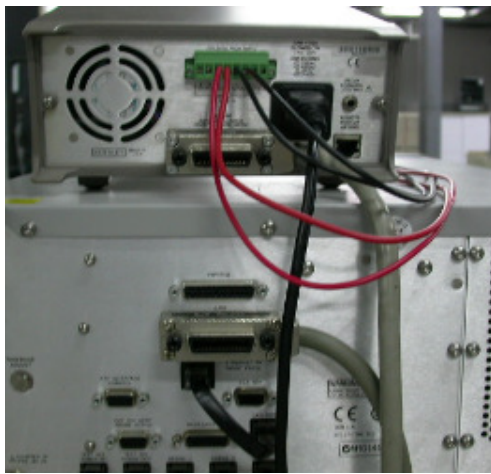
- Agilent 661x or Agilent 663x2 series power supply
- R&S NGSM Power Supply
- KEITHLEY 2303, 2304, 2306
- Agilent 3631A power supply
- Willtek WT4400 power supply option

Others

USB download cable  
Dummy battery  
RF cable

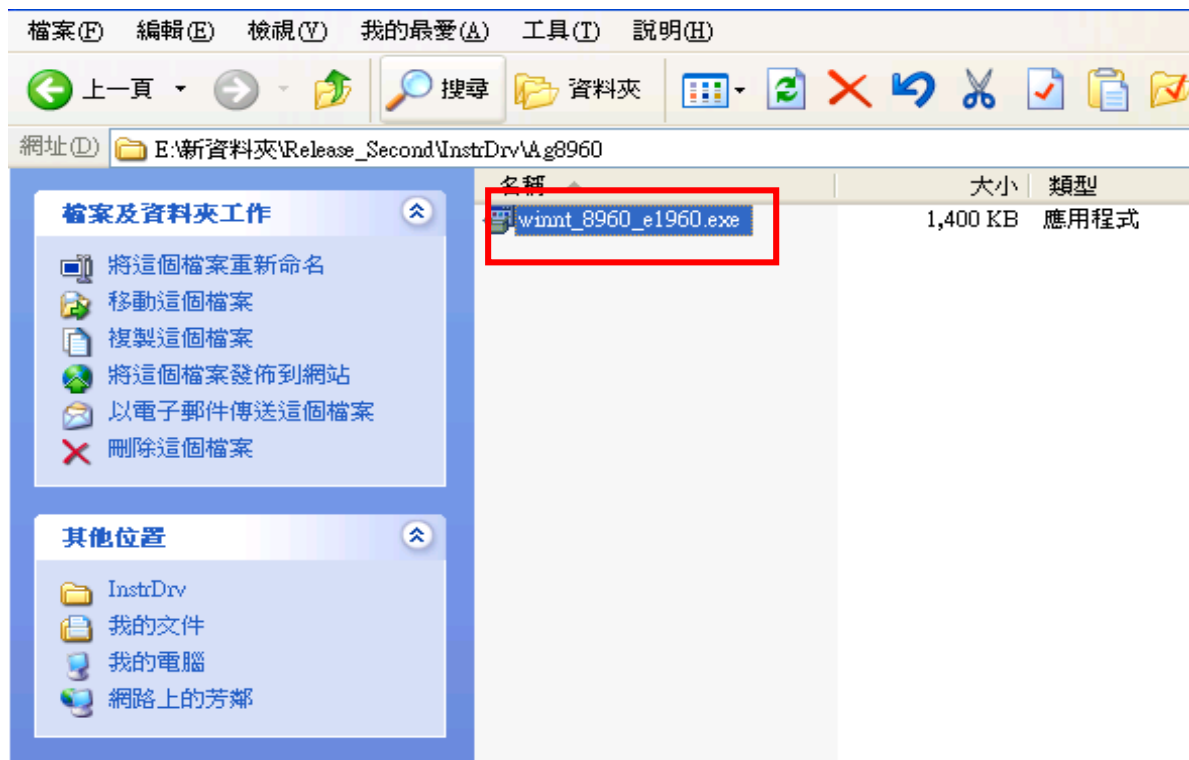
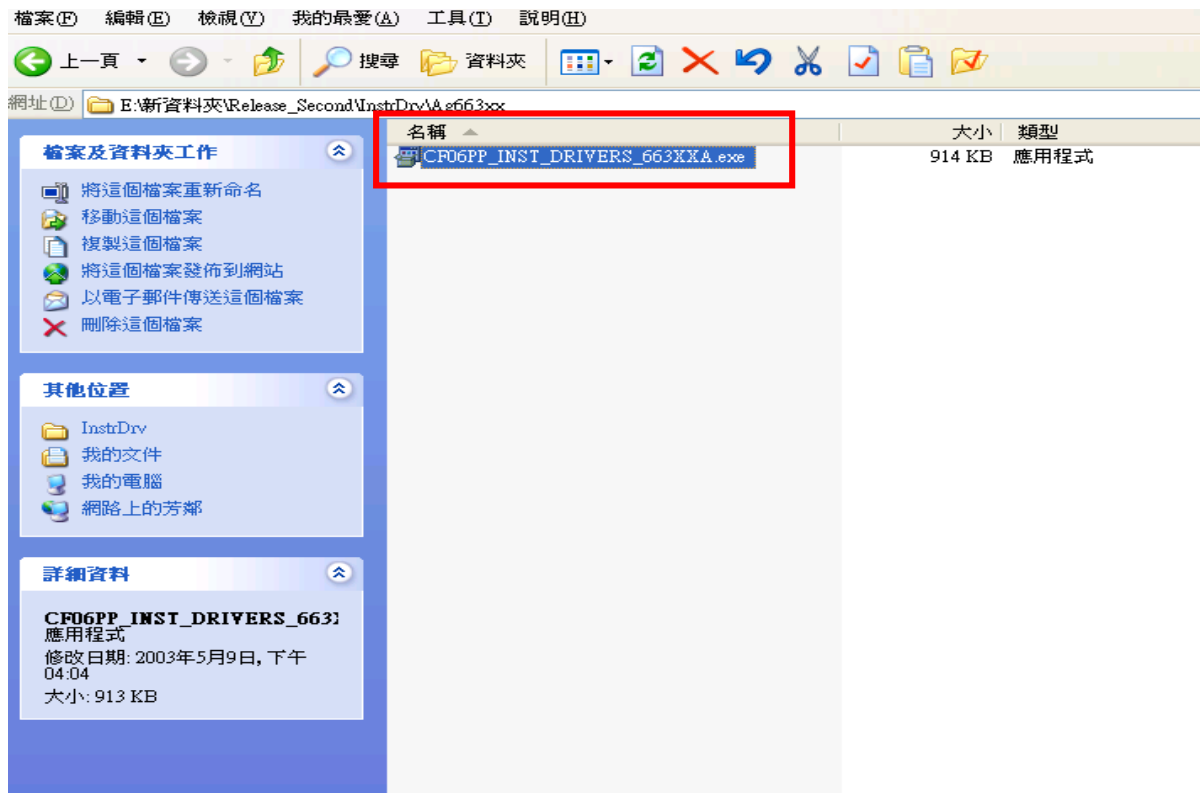
The following diagrams depict the system setups when using the Agilent test platform.

Connect 8960, power supply , computer ,phone



When install the MTK ATE tool, first install driver.

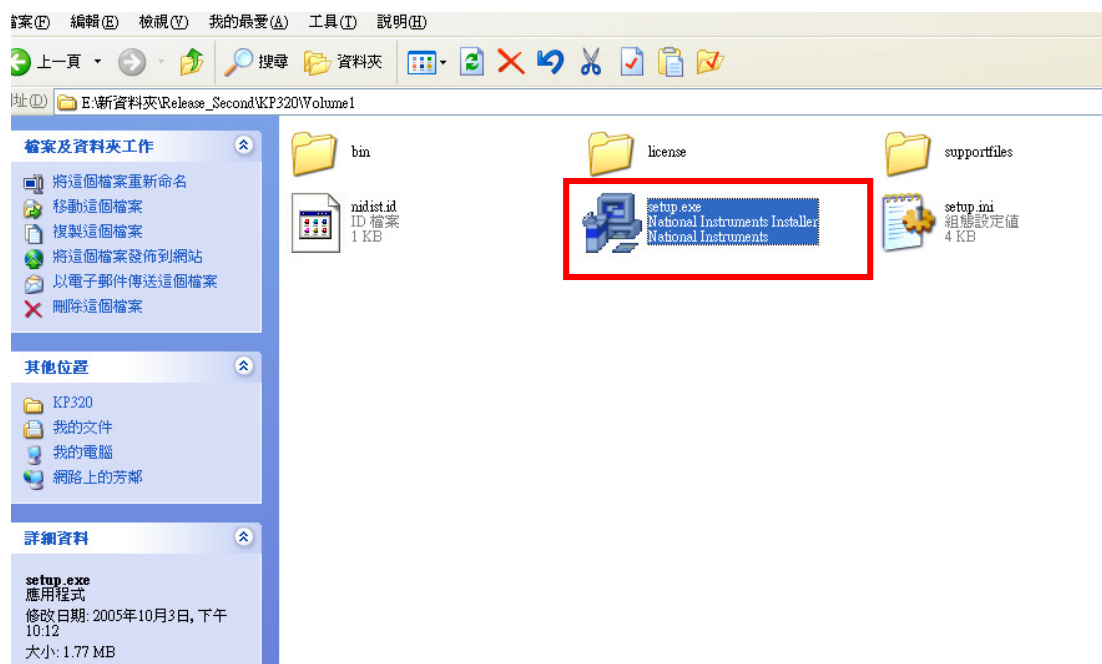
In turn execute [CF06PP\\_INST\\_DRIVERS\\_663XXA.exe](#), [winnt\\_8960\\_e1960.exe](#), [230x-850a01.exe](#).



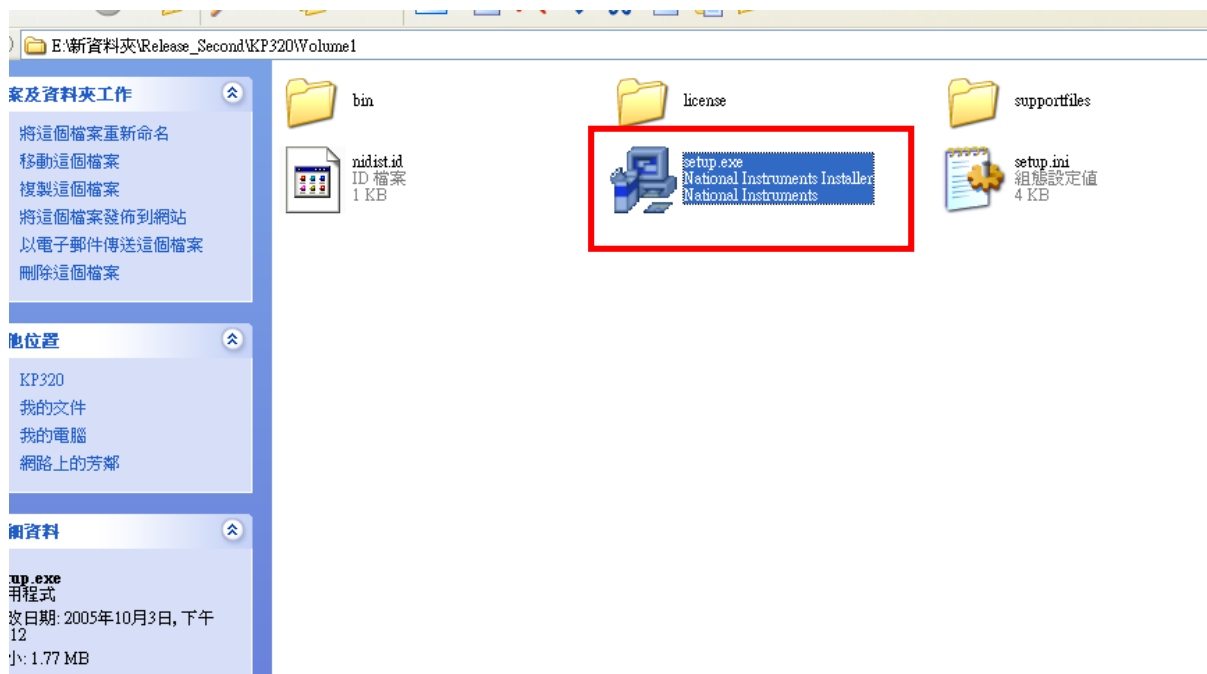




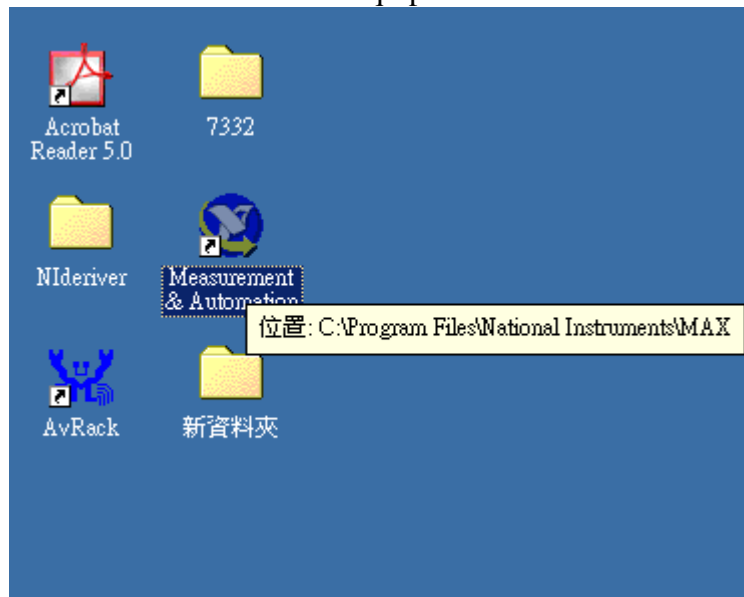
Second, to install the MTK ATE tool, execute the [KG195 \ Volume1 \setup.exe](#) file. The Installation Wizard guides the user through the installation process step by step, up to Installation finish.



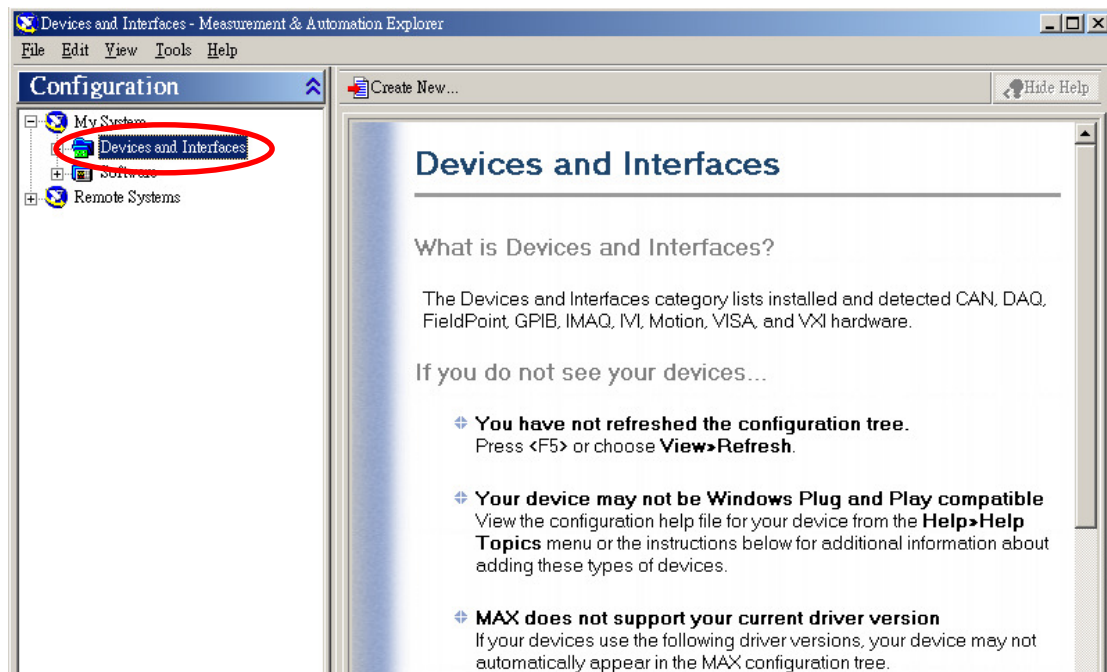
Third, to install the MTK ATE tool, execute the [KP320 \ Volume1 \setup.exe](#) file. The Installation Wizard guides the user through the installation process step by step, up to Installation finish.



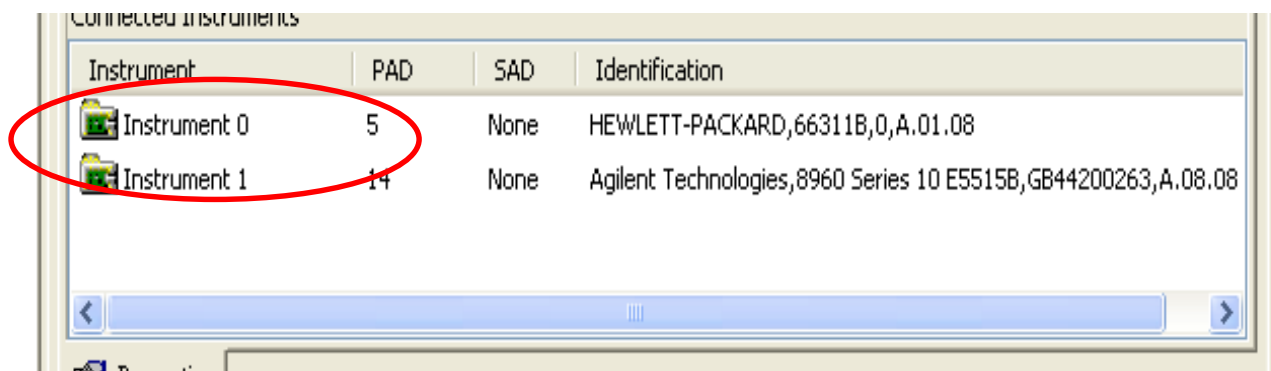
Execute Measurement & Automation to check equipment address



Choose Devices and Interfaces



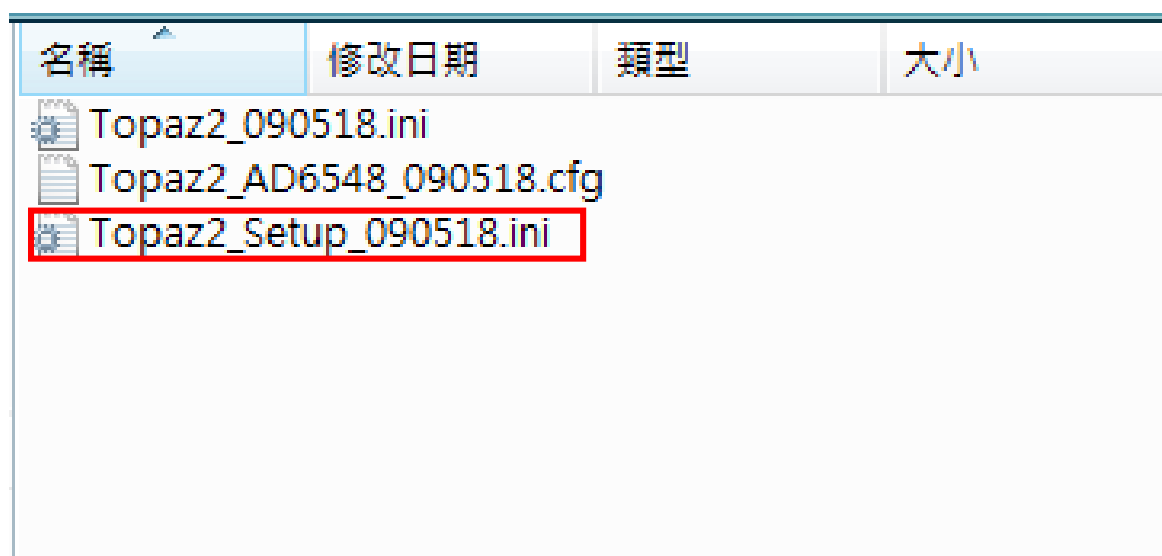
You can see your equipment address



The screenshot shows a window titled "Connected Instruments" with a table listing two instruments. The first row, "Instrument 0", is circled in red. The second row is "Instrument 1".

| Instrument   | PAD | SAD  | Identification  |
|--------------|-----|------|---|
| Instrument 0 | 5   | None | HEWLETT-PACKARD,66311B,0,A.01.08                              |
| Instrument 1 | 14  | None | Agilent Technologies,8960 Series 10 E5515B,GB44200263,A.08.08 |

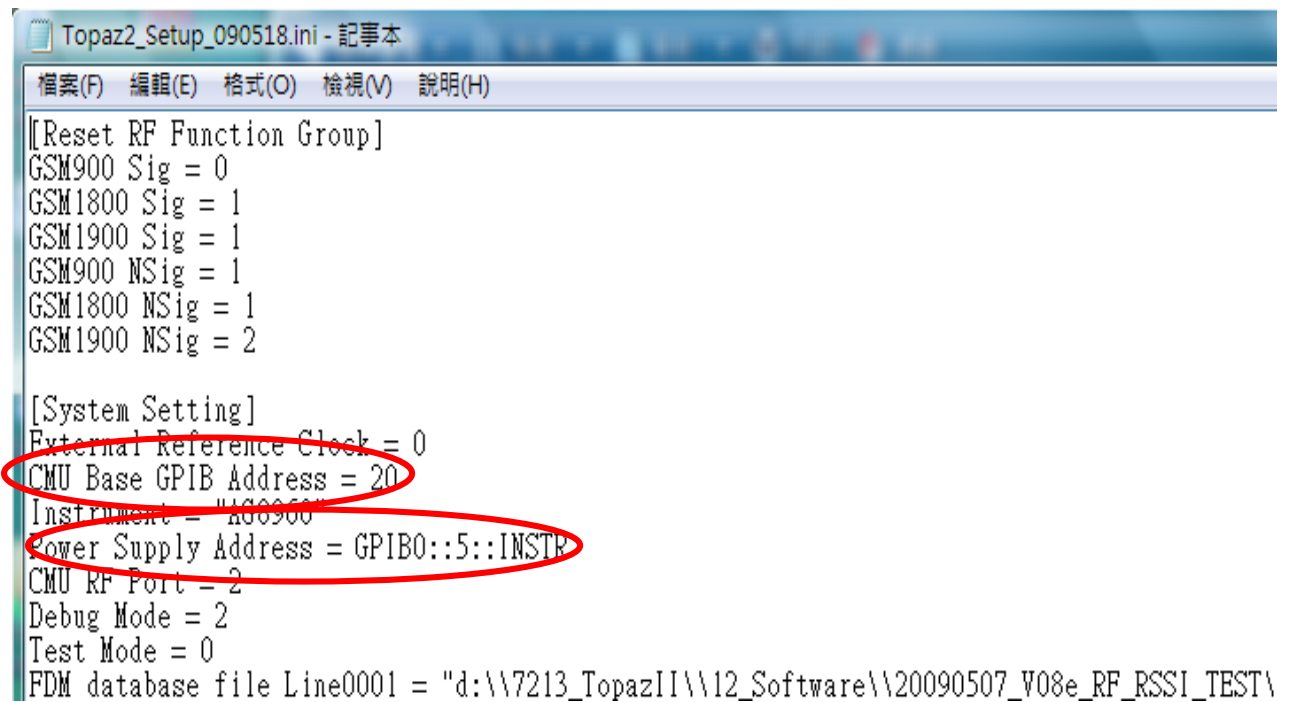
Choose **Topaz2\_Setup\_090518.ini** and open the file to setup from data files .  
(For example: GB170)



The screenshot shows a file explorer window with three files listed. The file "Topaz2\_Setup\_090518.ini" is highlighted with a red box.

| 名稱                       | 修改日期 | 類型 | 大小 |
|--------------------------|------|----|----|
| Topaz2_090518.ini        |      |    |    |
| Topaz2_AD6548_090518.cfg |      |    |    |
| Topaz2_Setup_090518.ini  |      |    |    |

Setup your CMU Base GPIB address and power supply address



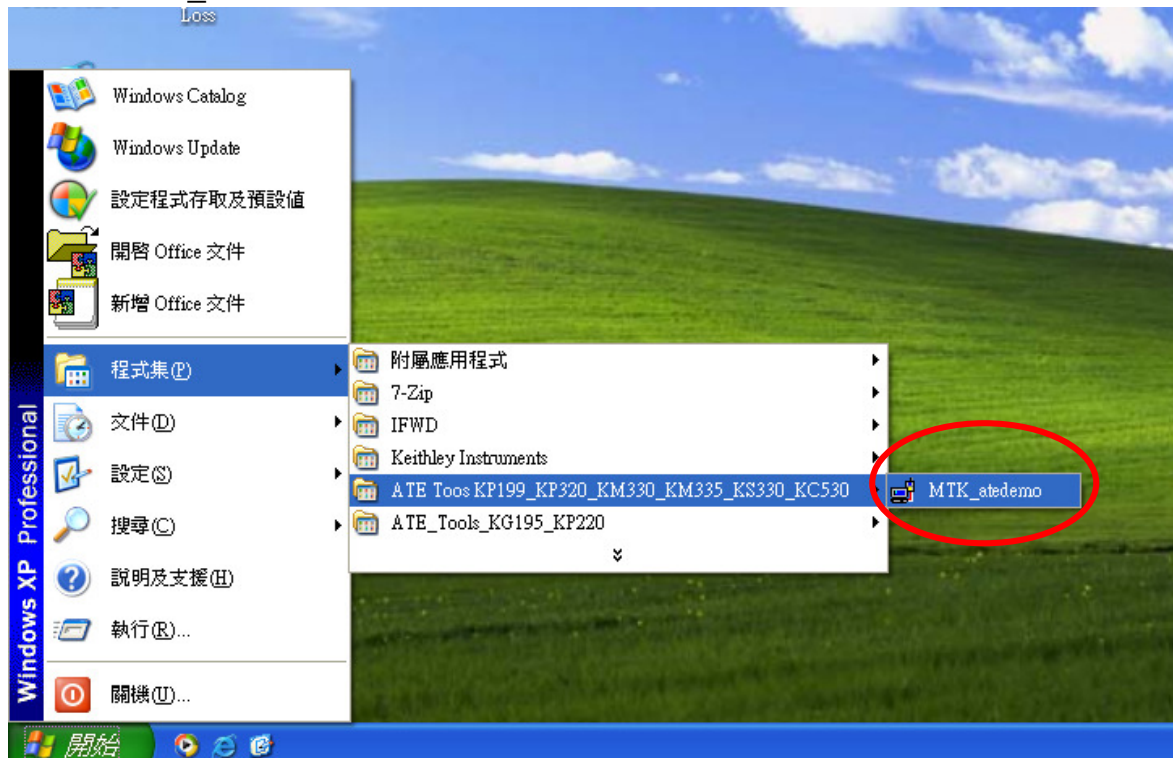
```
Topaz2_Setup_090518.ini - 記事本
檔案(F) 編輯(E) 格式(O) 檢視(V) 說明(H)

[[Reset RF Function Group]
GSM900 Sig = 0
GSM1800 Sig = 1
GSM1900 Sig = 1
GSM900 NSig = 1
GSM1800 NSig = 1
GSM1900 NSig = 2

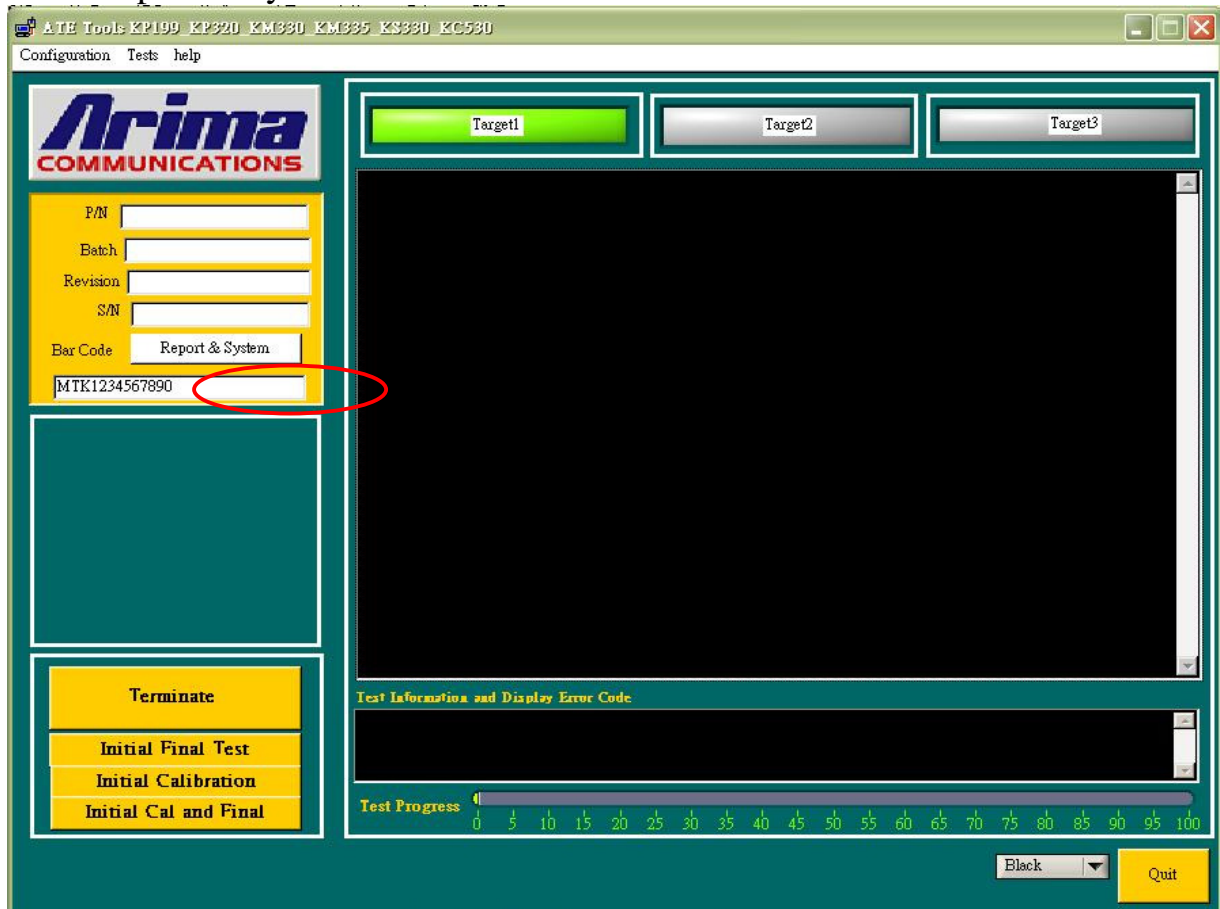
[System Setting]
External Reference Clock = 0
CMU Base GPIB Address = 20
Instrument = "AG0900"
Power Supply Address = GPIB0::5::INSTR
CMU RF Port = 2
Debug Mode = 2
Test Mode = 0
FDM database file Line0001 = "d:\\7213_TopazII\\12_Software\\20090507_V08e_RF_RSSI_TEST\\
```

## ATE Tool system setting

Execute MTK\_ate demo



Press Report & System button



## Setting your equipment

The screenshot shows the 'Unit Under Test' software interface with several configuration sections:

- Part Information:**
  - Part Number: MT6226
  - Batch: 01
  - Revision: W05.24
  - Serial Number: 000001
  - Bar Code: MTK1234567890
- GSM/EDGE Cal Setting:**
  - Band: ☐ GSM850 Cal ☒ GSM900 Cal ☒ DCS Cal ☒ PCS Cal
  - RX: ☐ Phase Error (CMU) ☐ IP2 Cal
  - ☐ AFC Cal ☒ PathLoss Calibration
  - TX GSM: ☒ TXIQ ☒ SKY (77328)
  - ☐ RFMD GSM ☐ Full PCL ☐ SKY EPSK (77316)
  - ☐ RENESAS ☒ APC Check ☐ Full PCL EPSK
  - Battery/ADC: ☒ ADC Cal/PSU Ctrl
- WiFi Cal:**
  - ☐ WiFi Tx De Offset ☐ WiFi TXP ☐ WiFi RF Check
- GSM/EDGE Final Setting:**
  - ☐ GSM850 ☒ GSM900 ☒ DCS ☒ PCS ☐ GPRS Test
- System Setting:**
  - TEST MODE SELECT: Manual Initial
  - Bar Code Get Type When Calibration: Scan Barcode
  - Power Supply Type: Agilent 663xx
  - PSU GPIB Address: GPIB0::5::INSTR
  - GSM/EDGE Tester: Agilent 8960
  - CMU RF Port: RF1
  - WiFi Tester: IQVIEW
  - BT Tester: CMU200
  - Baseband Chip Type: AutoDetect
  - COM Port Select: COM 5
  - ☐ Cal INP LOSS ☐ Cal OUP LOSS
- File Selection:**
  - NVRAM Database file: d:\Work\flash.img\7338\EP3\KP220-00-V10a-404-XX-JAN-26-2008(R1Q)\BPLGUIInfoCustomSrcP\_KP220-00-V10a-404-
  - Config File Location (CFG file): c:\Documents and Settings\游佳斌\My Documents\7338\_EP3\_ATE data\meta\_7338\_EP3\_20071218.CFG
  - Calibration File Location (ini file): c:\Documents and Settings\游佳斌\My Documents\7338\_EP3\_ATE data\MTKCAL\_7338\_EP3\_20071218.ini
  - Test Setup File Location (Setup file): c:\Documents and Settings\游佳斌\My Documents\7338\_EP3\_ATE data\MTK\_7338\_SETUP\_EP3\_20071218.ini
  - Test Report Location: c:\Documents and Settings\游佳斌\My Documents\7338\_EP3\_ATE data\Test date
  - Report Database Location: c:\Program Files\MTK\_atdemo\mtk\_ate.xls

## Setting your power supply type

The 'System Setting' section is shown in detail. A blue callout box with the text 'Choose your Power Supply Type' points to the 'Power Supply Type' dropdown menu, which is currently set to 'KEITHLEY230'. Other settings in this section include:

- TEST MODE SELECT: Manual Initial
- Bar Code Get Type When Calibration: Scan Barcode
- PSU GPIB Address: 7
- GSM/EDGE Tester: Agilent 8960
- CMU RF Port: RF2
- WiFi Tester: IQVIEW
- BT Tester: CMU200
- Baseband Chip Type: 6226
- COM Port Select: COM 6
- ☐ Cal INP LOSS ☐ Cal OUP LOSS

Setting your GSM/EDGE Tester

System Setting

TEST MODE SELECT

Manual Initial

Bar Code Get Type When Calibration

Scan Barcode

Power Supply Type

KEITHLEY230.

PSU GPIB Address

7

GSM/EDGE Tester

Agilent 8960

CMU RF Port

RF2

WiFi Tester

IQVIEW

BT Tester

CMU200

Baseband Chip Type

6226

COM Port Select

COM 6

☐ Cal INP LOSS

☐ Cal OUP LOSS

Choose your Tester

Choose your download com port

System Setting

TEST MODE SELECT

Manual Initial

Bar Code Get Type When Calibration

Scan Barcode

Power Supply Type

KEITHLEY230.

PSU GPIB Address

7

GSM/EDGE Tester

Agilent 8960

CMU RF Port

RF2

WiFi Tester

IQVIEW

BT Tester

CMU200

Baseband Chip Type

6226

COM Port Select

COM 6

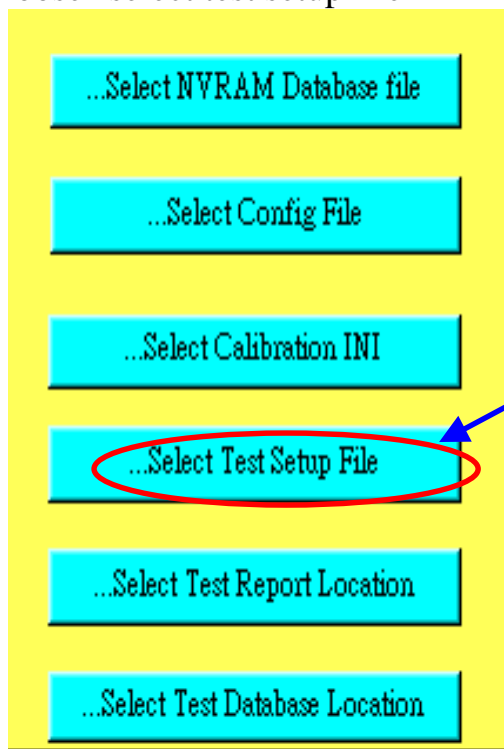
☐ Cal INP LOSS

☐ Cal OUP LOSS

Choose your download cable connect COM port

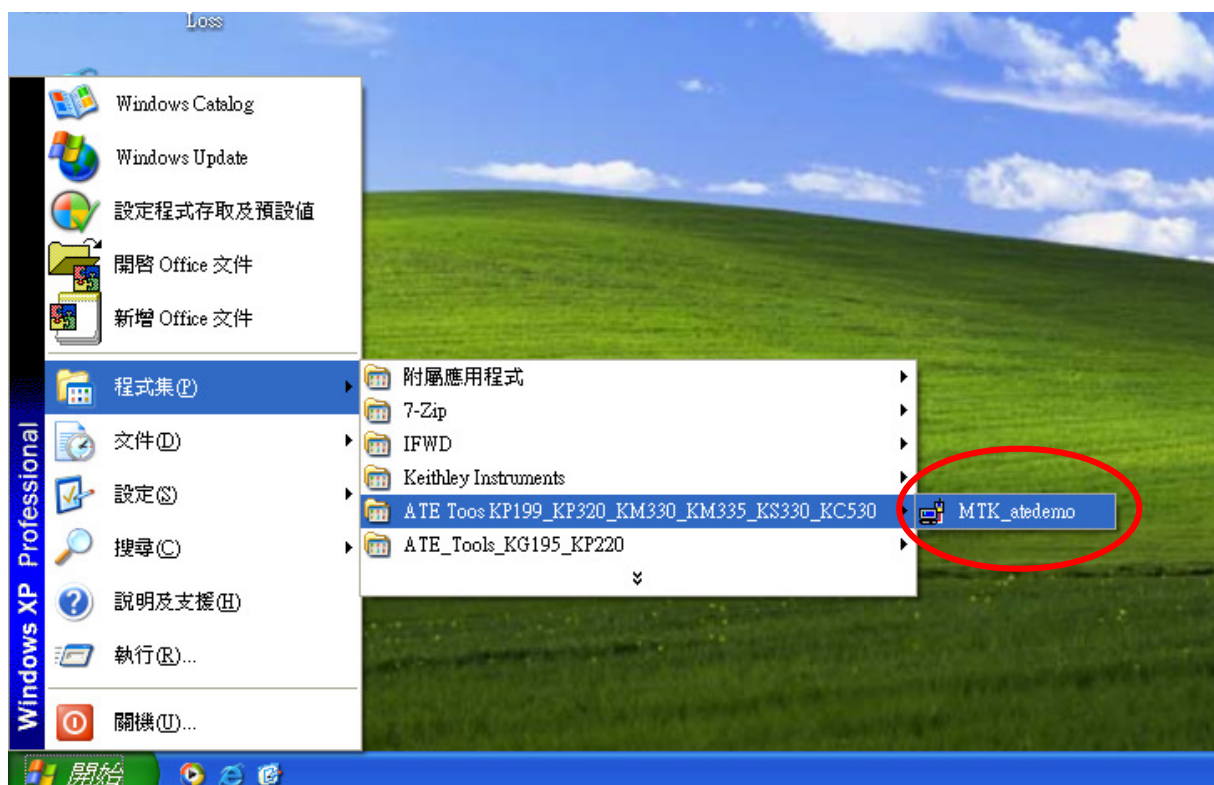


Choose “select test setup file”

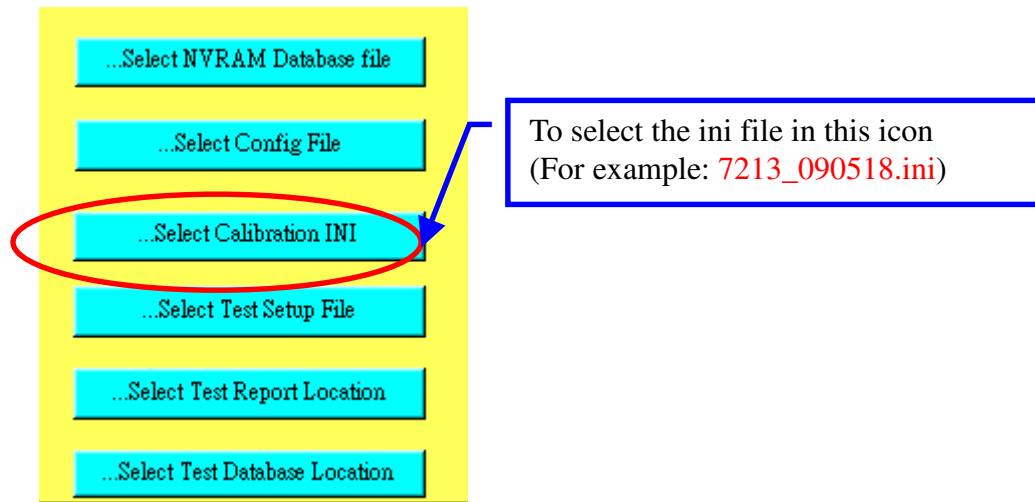


To select the setup file in this icon  
(For example: 7213\_SETUP\_090518.ini)

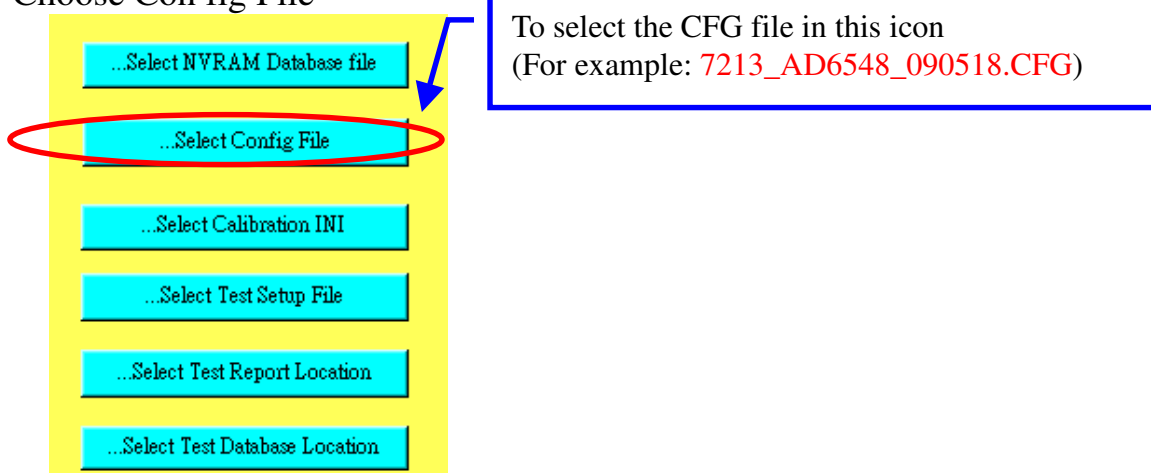
Execute MTK \_ ate demo again



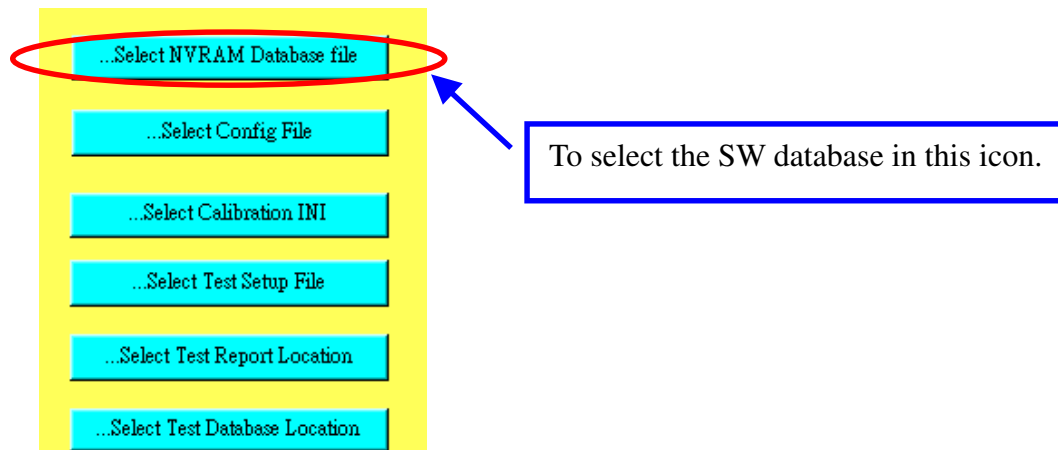
### Choose Calibration INI



### Choose Con fig File

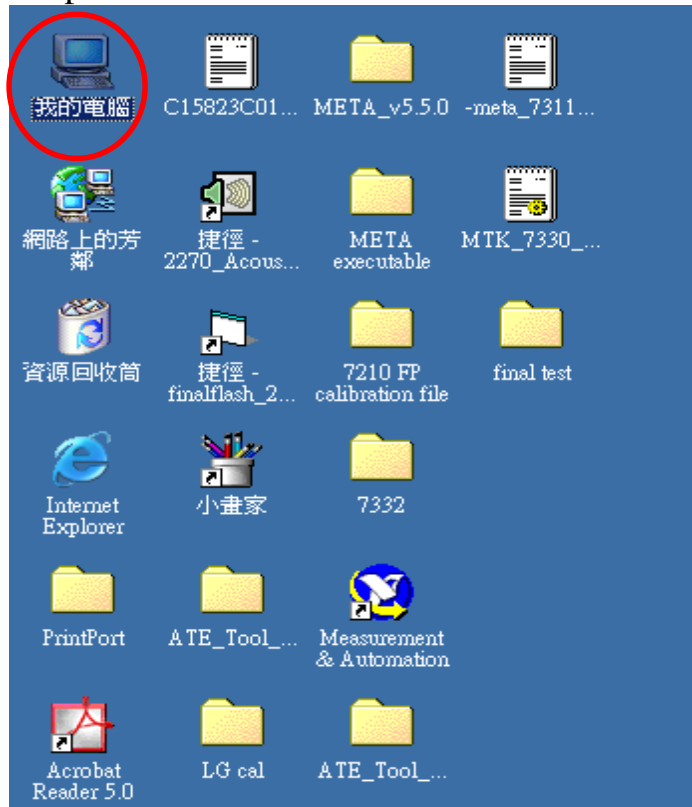


### Choose NVRAM Database file



# How to setup your test report location

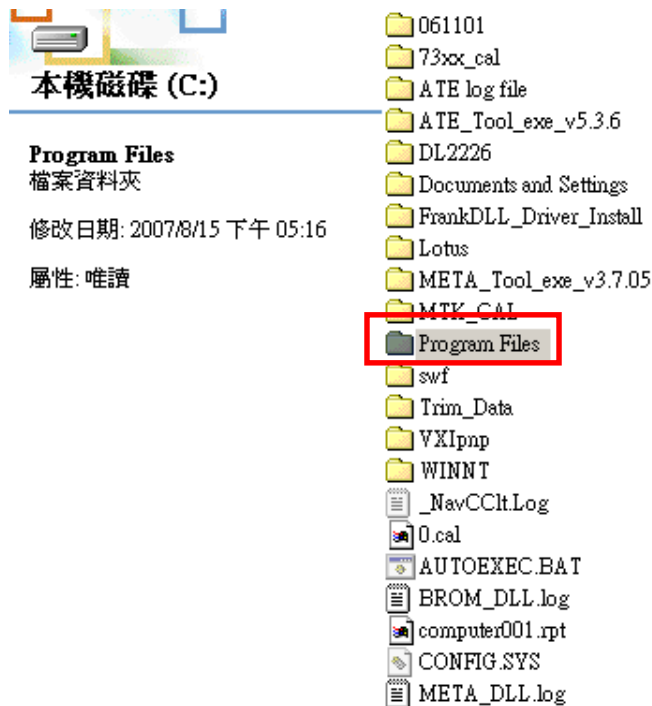
Choose my computer



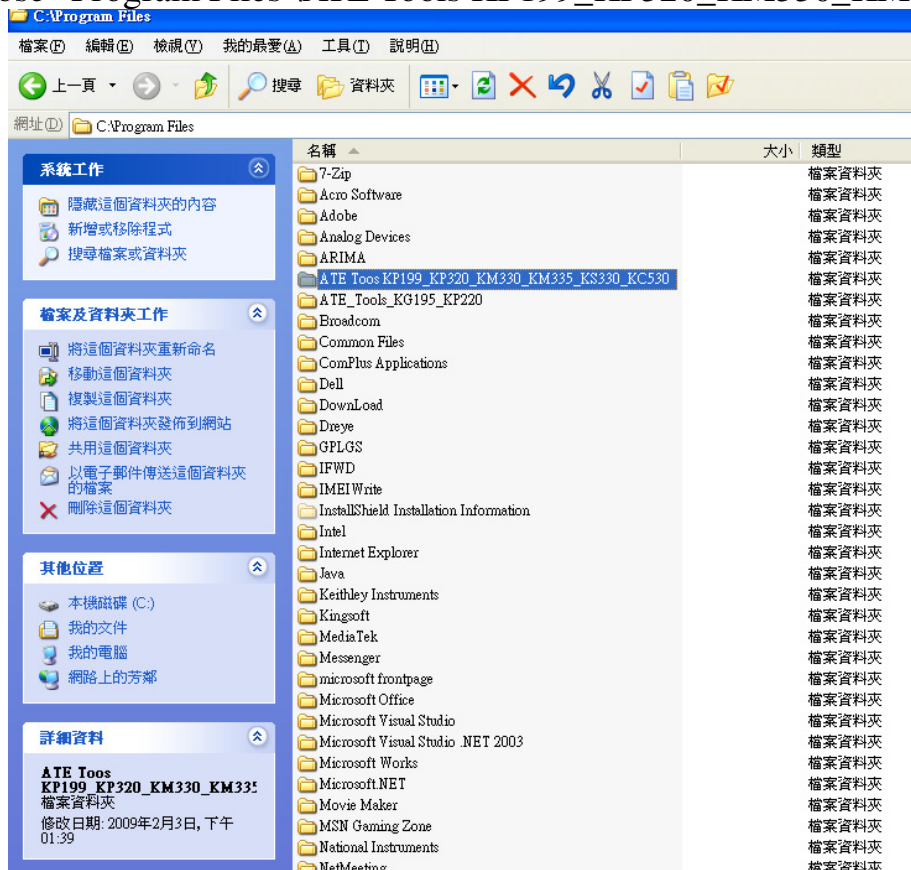
Choose “C” disk

| 名稱 ▲         | 類型                         | 大小總計    | 可用空間    |
|--------------|----------------------------|---------|---------|
| 3.5 軟碟機 (A:) | 3.5 吋軟式磁碟機                 |         |         |
| 本機磁碟 (C:)    | 本機磁碟                       | 18.6 GB | 15.6 GB |
| 新增磁碟區 (D:)   | 本機磁碟                       | 18.6 GB | 16.0 GB |
| 控制台          | 可用空間: 15.6 GB, 容量: 18.6 GB |         |         |

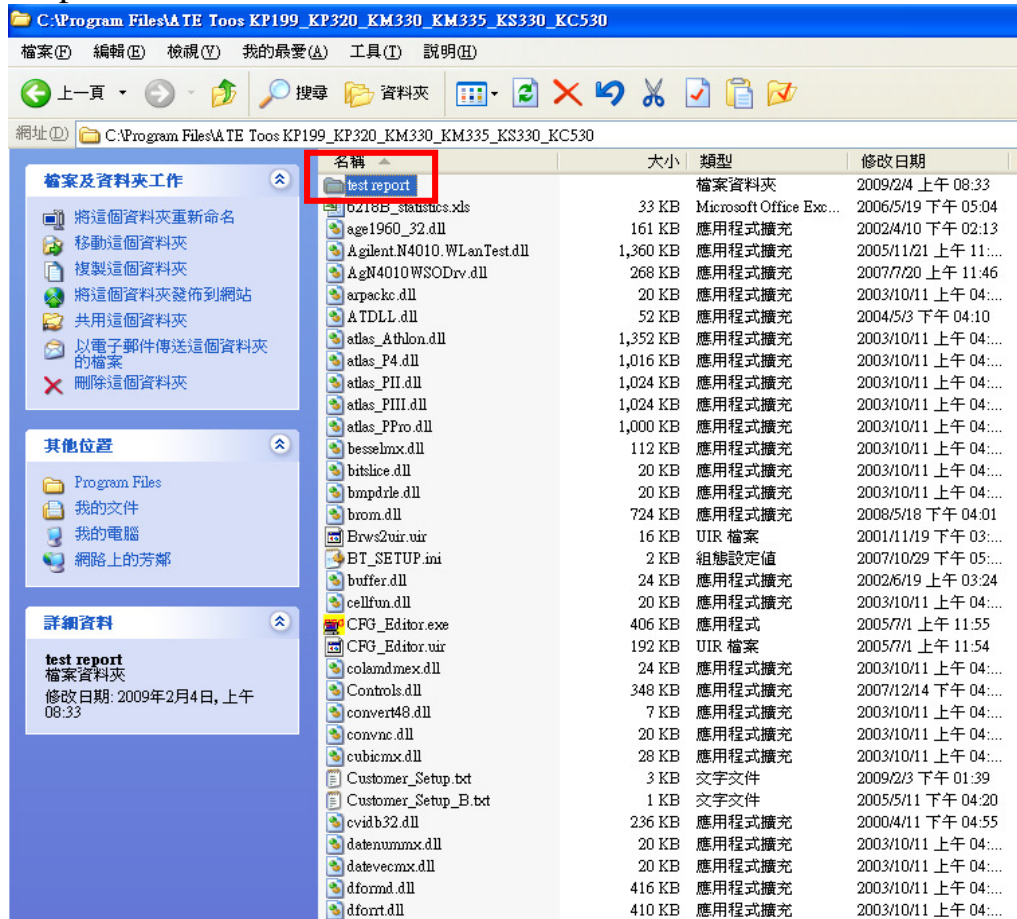
Choose “program files”



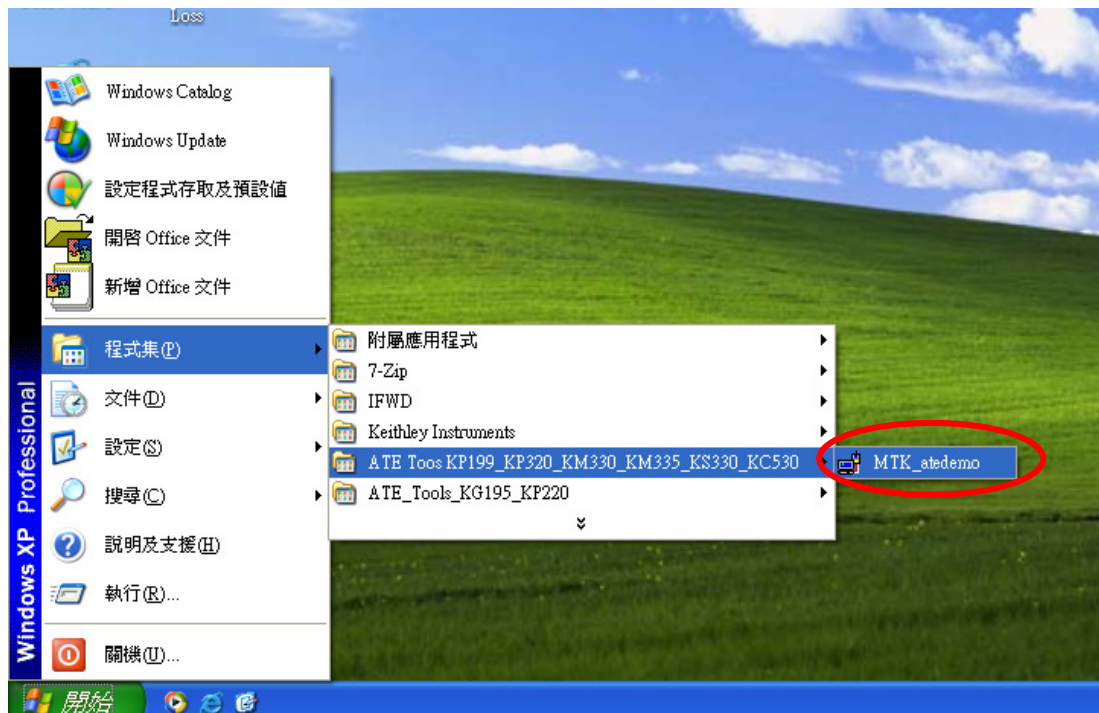
Choose “Program Files \ATE Tools KP199\_KP320\_KM330\_KM335\_KC530”file



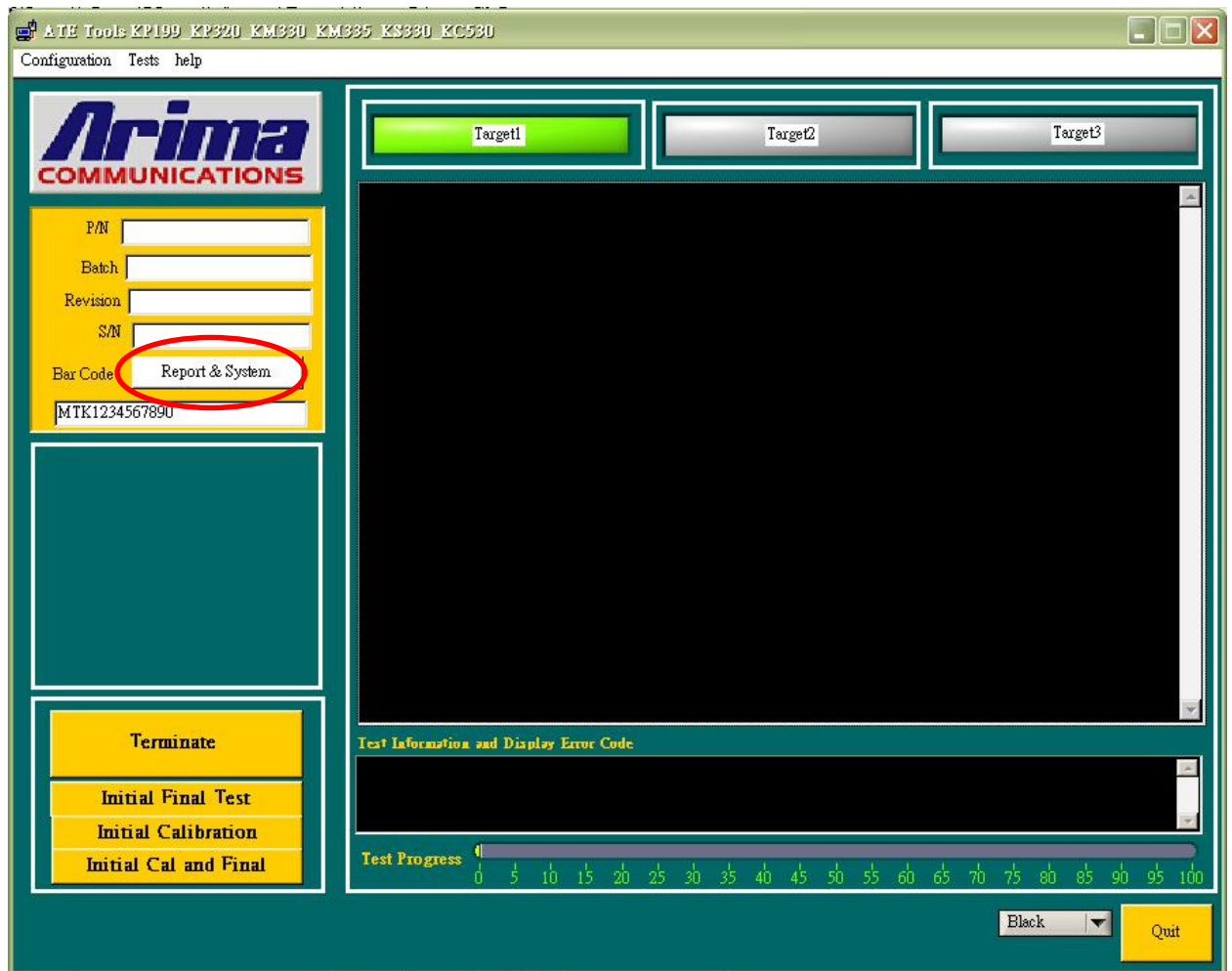
## Setup new file and leave the window



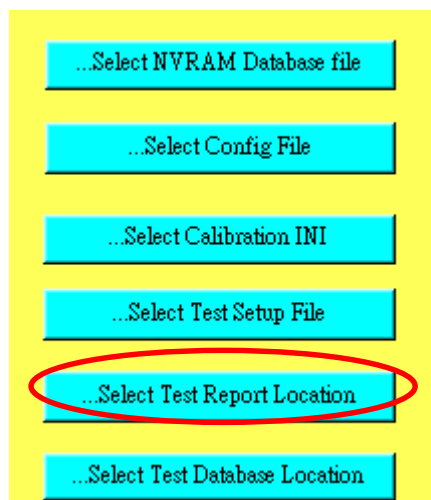
## Execute MTK\_ate demo



Press Report & System button

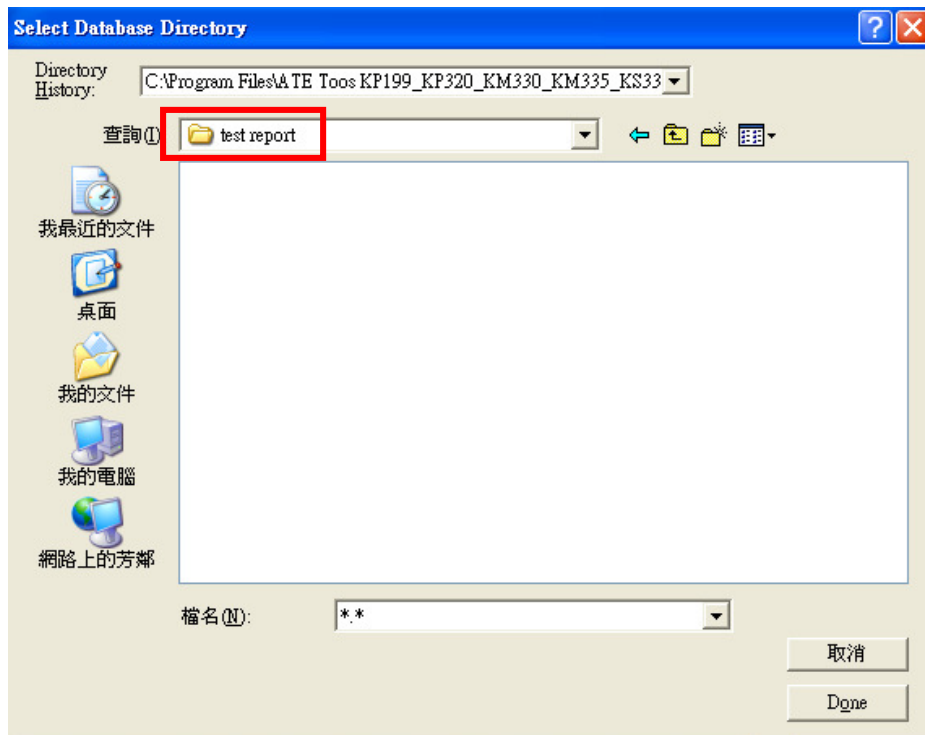


Press “select test report location”





Choose your setup report



Press “Done”



## Setup finish

**Unit Under Test**

**Part Information**

Part Number: MTK\_6218B  
 Batch: 01  
 Revision: W05.24  
 Serial Number: 000001  
 Bar Code: zz999

**GSM/EDGE Cal Setting**

Band:  
☐ GSM850 Cal ☒ GSM900 Cal ☒ DCS Cal ☒ PCS Cal  
 RX:  
☐ Phase Error (CMU) ☐ IP2 Cal  
☒ APC Cal ☒ PathLoss Calibration  
 TX GSM: ☐ TXIQ ☒ SKY (77328)  
☐ RFMD GSM ☐ Full PCL ☐ SKY EPSK (77316)  
☐ RENESAS ☒ APC Check ☐ Full PCL EPSK  
 Battery/ADC: ☒ ADC Cal/PSU Ctl

**System Setting**

TEST MODE SELECT: Manual Initial  
 Bar Code Get Type When Calibration: Scan Barcode  
 Power Supply Type: KEITHLEY2300G PSU GPIB Address: 7  
 GSM/EDGE Tester: Agilent 8960 CMU RF Port: RF2  
 WiFi Tester: IQVIEW  
 BT Tester: CMU200  
 Baseband Chip Type: 6226 COM Port Select: COM 6  
☐ Cal INP LOSS ☐ Cal OUP LOSS

**File Selection**

NVRAM Database file: c:\Program Files\MTK\_demo\7332\BPLGUInfoCustomSrcP\_7873320000-001-R1B  
 Config File Location (CFG file): c:\Program Files\MTK\_demo\7332\meta\_7332\_ep2\_2\_20070622.CFG  
 Calibration File Location (ini file): c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\MTK\7332\_ep1\_20070322.ini  
 Test Setup File Location (Setup file): c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\MTK\_7332\_SETUP\_ep1\_20070322.ini  
 Test Report Location: c:\Program Files\MTK\_demo\test report  
 Report Database Location: c:\Program Files\MTK\_demo\mtk\_ate.xls

**Save Change**

When you finish the setup then you press **save change** icon.

**Unit Under Test**

**Part Information**

Part Number: MTK\_6218B  
 Batch: 01  
 Revision: W05.24  
 Serial Number: 000001  
 Bar Code: MTK1234567890

**GSM/EDGE Cal Setting**

Band:  
☐ GSM850 Cal ☒ GSM900 Cal ☒ DCS Cal ☒ PCS Cal  
 RX:  
☐ Phase Error (CMU) ☐ IP2 Cal  
☒ APC Cal ☒ PathLoss Calibration  
 TX GSM: ☐ TXIQ ☒ SKY (77328)  
☐ RFMD GSM ☐ Full PCL ☐ SKY EPSK (77316)  
☐ RENESAS ☒ APC Check ☐ Full PCL EPSK  
 Battery/ADC: ☒ ADC Cal/PSU Ctl

**System Setting**

TEST MODE SELECT: Manual Initial  
 Bar Code Get Type When Calibration: Scan Barcode  
 Power Supply Type: KEITHLEY2300G PSU GPIB Address: 7  
 GSM/EDGE Tester: Agilent 8960 CMU RF Port: RF2  
 WiFi Tester: IQVIEW  
 BT Tester: CMU200  
 Baseband Chip Type: 6226 COM Port Select: COM 6  
☐ Cal INP LOSS ☐ Cal OUP LOSS

**File Selection**

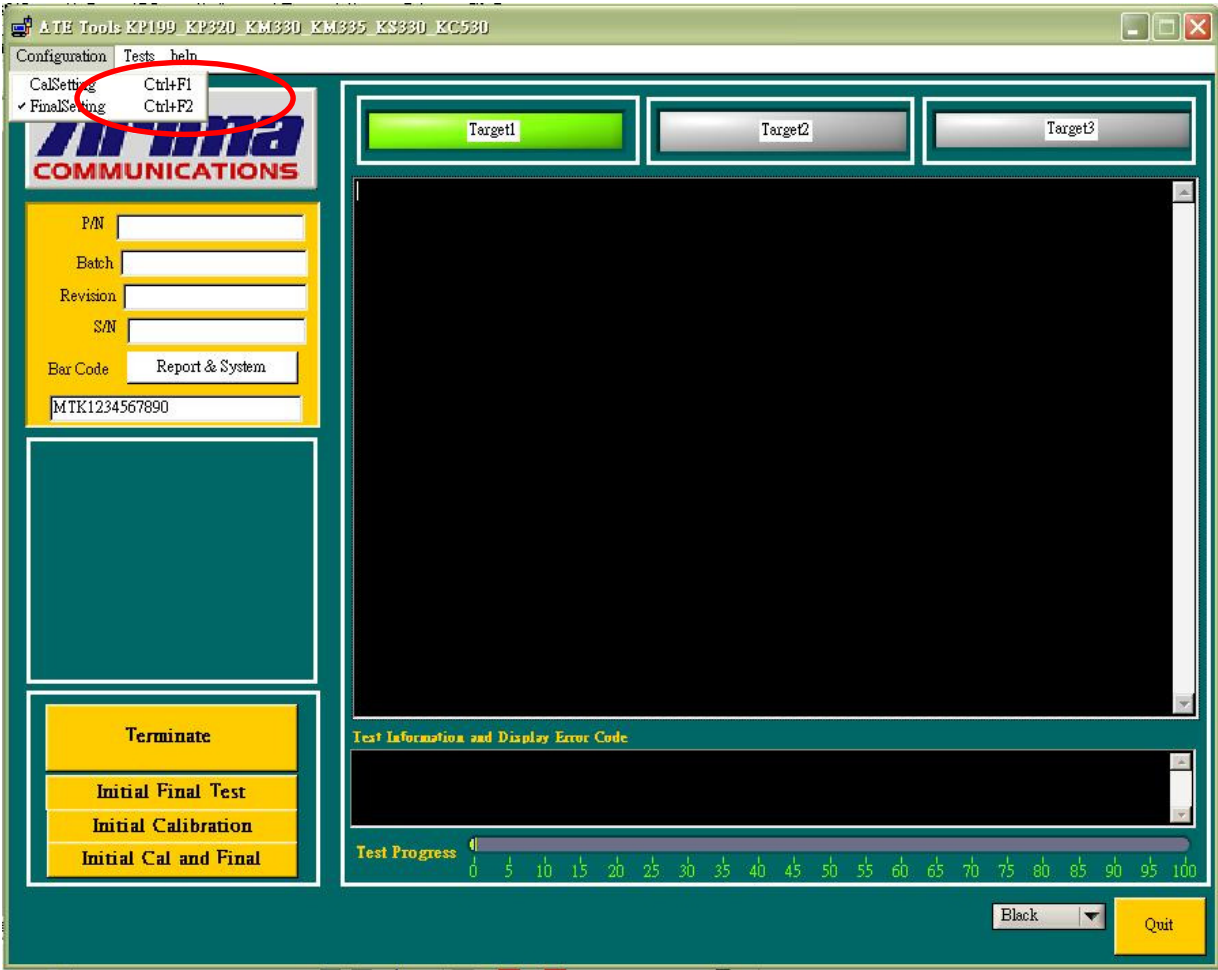
NVRAM Database file: c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\BPLGUInfoCustomSrcP\_7873320000-001-R1B  
 Config File Location (CFG file): c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\meta\_7332\_ep2\_2\_20070622.CFG  
 Calibration File Location (ini file): c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\MTK\7332\_ep1\_20070322.ini  
 Test Setup File Location (Setup file): c:\Documents and Settings\Administrator\COMPUTER001\桌面\7332\MTK\_7332\_SETUP\_ep1\_20070322.ini  
 Test Report Location: c:\ATE log file  
 Report Database Location: c:\Program Files\MTK\_demo\mtk\_ate.xls

**Save Change**

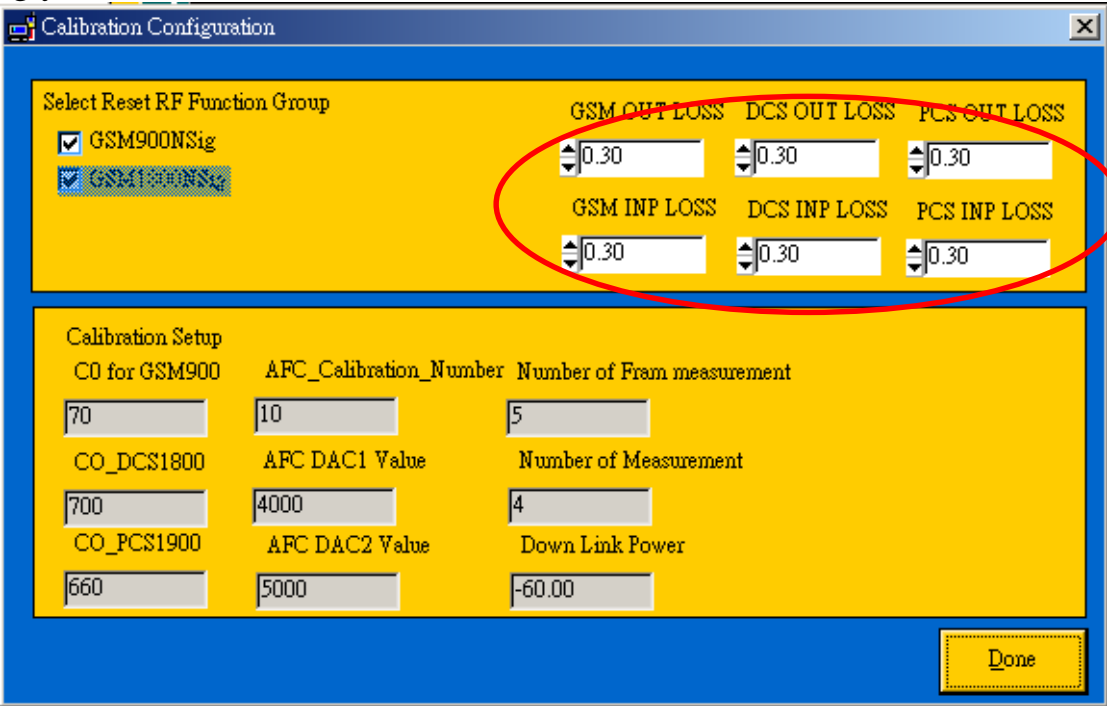
**ATE INFORMATION**  
 Setting change, Please restart program!  
 OK



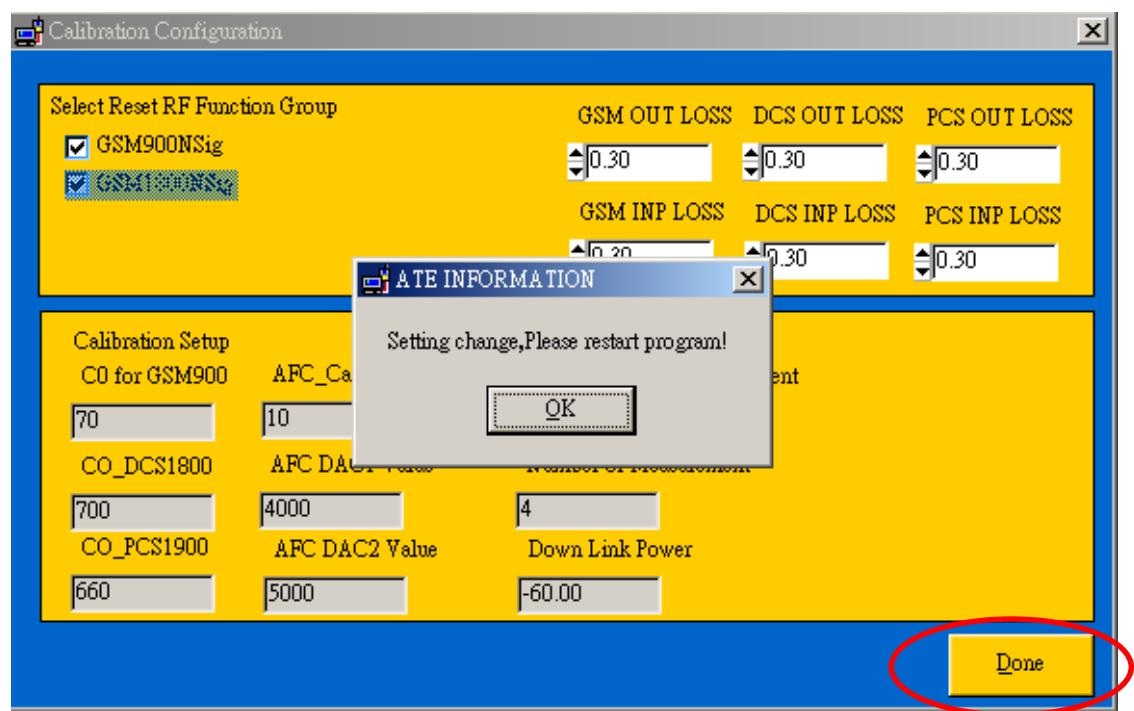
Press Configuration choose Cal Setting



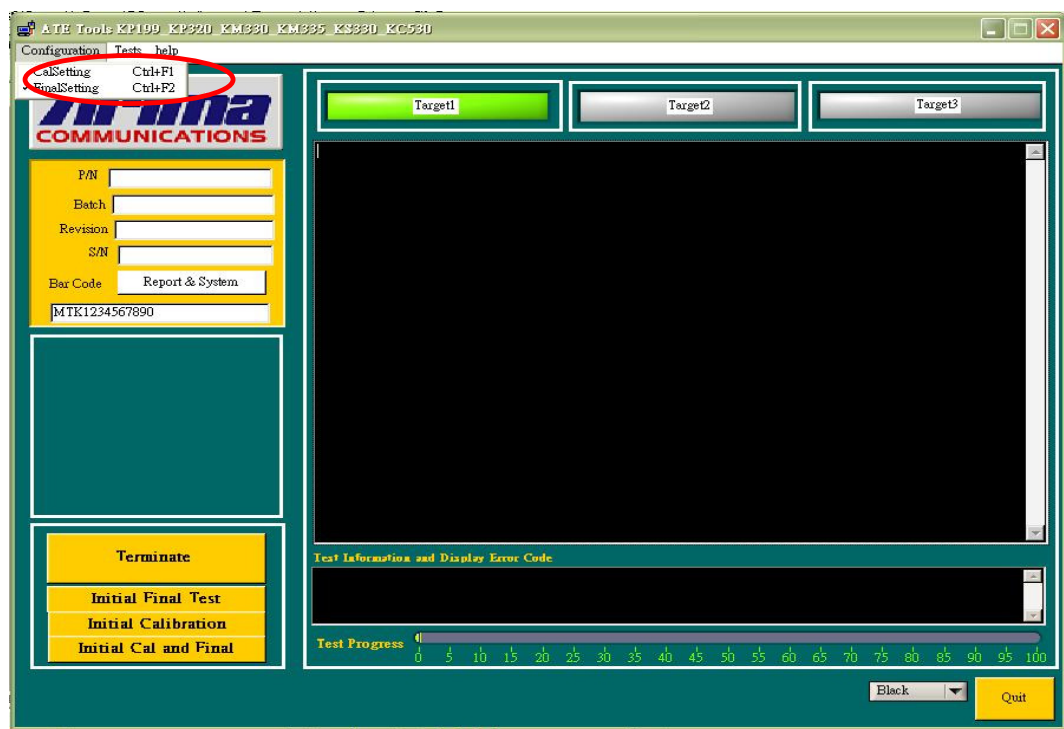
Setting your cable loss



Press Done to save



Press Configuration choose Final setting



Choose “MT Call” from Establish Call Type

**Select Reset RF Function Group**

- ☒ GSM850 Sig
- ☐ GSM 900 Sig
- ☒ GSM 1800 Sig
- ☒ GSM 1900 Sig

**Establish Call Type** ☒ MT Call ☐ MO Call

**IMSI NUMBER**  
001011234567890

☐ External 10MHz Reference Clock

**Call Setup Configuration**

Call Setup Channel BCCH Channel

**GSM850** 128 128

Call Setup Channel BCCH Channel Call Setup Network

**GSM** 1 32 GSM900

Call Setup Channel BCCH Channel BCCH RF LEVEL

**DCS** 512 700 -60.00

Call Setup Channel BCCH Channel BS TCH LEVEL

**PCS** 512 700 -81.00

GPRS Test Mode GPRS Test Mode

**GPRS** AG USFER MCS9 ☐ GPRS ACK ON/OFF

Multi Slot

Key in your test SIM card number form IMSI NUMBER

**Select Reset RF Function Group**

- ☒ GSM850 Sig
- ☐ GSM 900 Sig
- ☒ GSM 1800 Sig
- ☒ GSM 1900 Sig

**Establish Call Type** ☒ MT Call ☐ MO Call

**IMSI NUMBER**  
001011234567890

☐ External 10MHz Reference Clock

**Call Setup Configuration**

Call Setup Channel BCCH Channel

**GSM850** 128 128

Call Setup Channel BCCH Channel Call Setup Network

**GSM** 1 32 GSM900

Call Setup Channel BCCH Channel BCCH RF LEVEL

**DCS** 512 700 -60.00

Call Setup Channel BCCH Channel BS TCH LEVEL

**PCS** 512 700 -81.00

GPRS Test Mode GPRS Test Mode

**GPRS** AG USFER MCS9 ☐ GPRS ACK ON/OFF

Multi Slot

Press “Done” and save your setting

**Final Test Configurations**

**Select Reset RF Function Group**

- ☒ GSM850 Sig
- ☐ GSM 900 Sig
- ☒ GSM 1800 Sig
- ☒ GSM 1900 Sig

**Establish Call Type** ☒ MT Call ☐ MO Call

**IMSI NUMBER**  
001011234567890

☐ External 10MHz Reference Clock

**Call Setup Configuration**

Call Setup Channel BCCH Channel

**GSM850** 128 128

Call Setup Channel BCCH Channel Call Setup Network

**GSM** 1 32 GSM900

Call Setup Channel BCCH Channel BCCH RF LEVEL

**DCS** 512 700 -60.00

Call Setup Channel BCCH Channel BS TCH LEVEL

**PCS** 512 700 -81.00

GPRS Test Mode GPRS Test Mode

**GPRS** AG USFER MCS9 ☐ GPRS ACK ON/OFF

Multi Slot

**Measurement Configurations**

Power

Power Measment Burst 10

Modulation

Modulation 10

☒ Average Burst Power

☒ Peak Burst Power

☒ PVT Match

☒ Timing Error

☒ Phase Error

☒ Phase Error RMS

☒ Frequency Error

**Bluetooth Loss**

BT OUT LOSS 0.50

BT INP LOSS 0.50

**GSM850 LOSS /**

GSM OUT LOSS 0.30

DCS OUT LOSS 0.30

PCS OUT LOSS 0.30

GSM INP LOSS 0.30

DCS INP LOSS 0.30

PCS INP LOSS 0.30

**Rx Report**

☒ RX Quality

☒ RX Level

☐ RFER

☒ BBB

☒ Manual BER Limit Check

**Rx Quality**

GSM Rx Meas Level -100.00

PCS Rx Meas Level -100.00

DCS Rx Meas Level -100.00

GSM850 Rx Meas Level -100.00

Rx RFER Burst 128

Rx BBB Burst 88

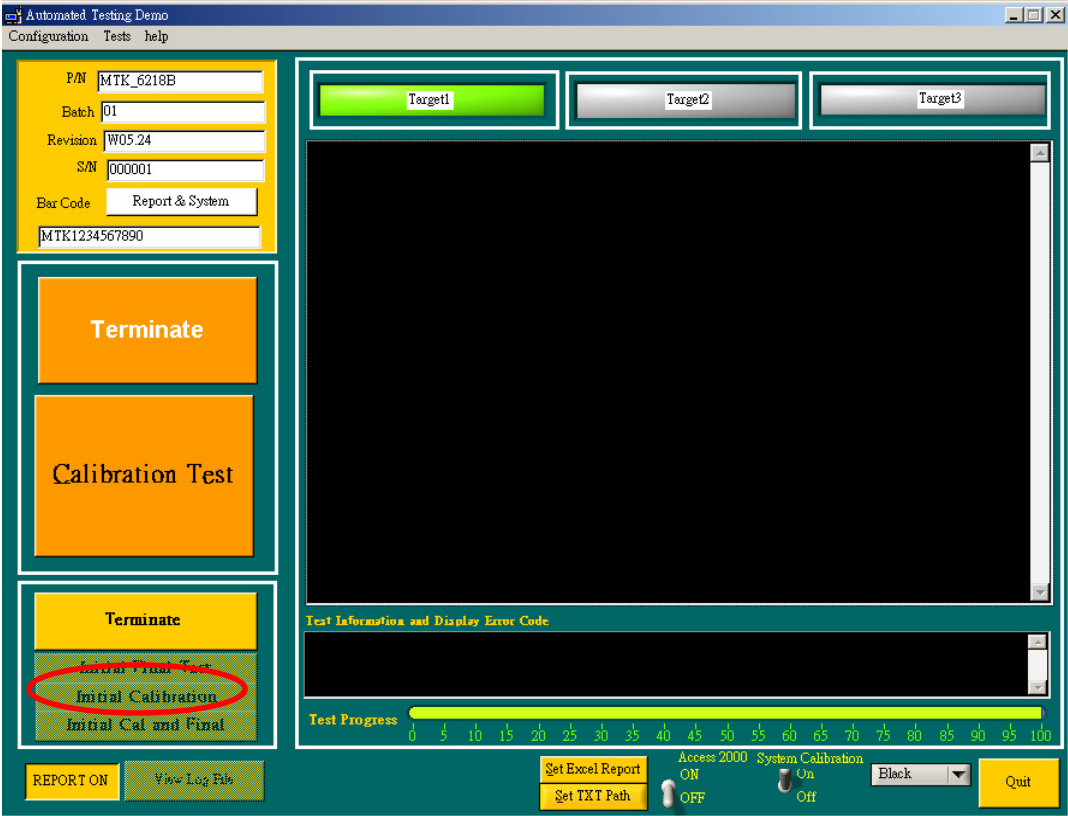
**ATE INFORMATION**

Setting change, Please restart program!

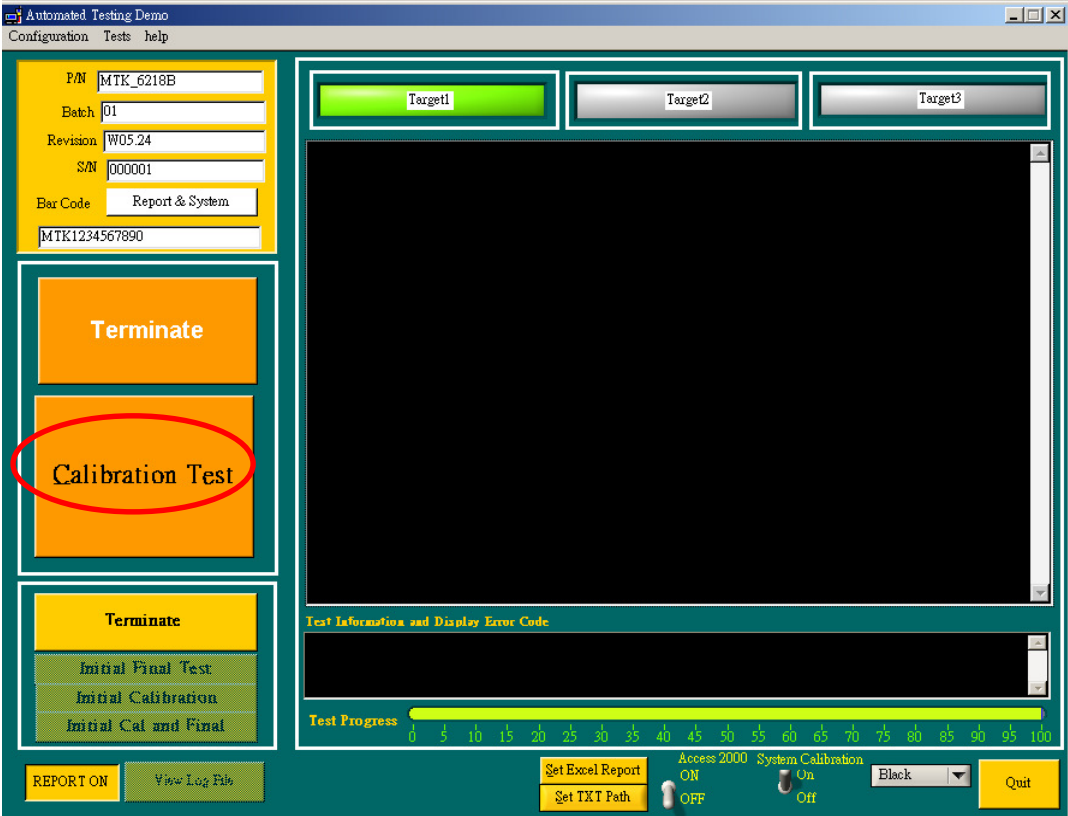
OK

Done

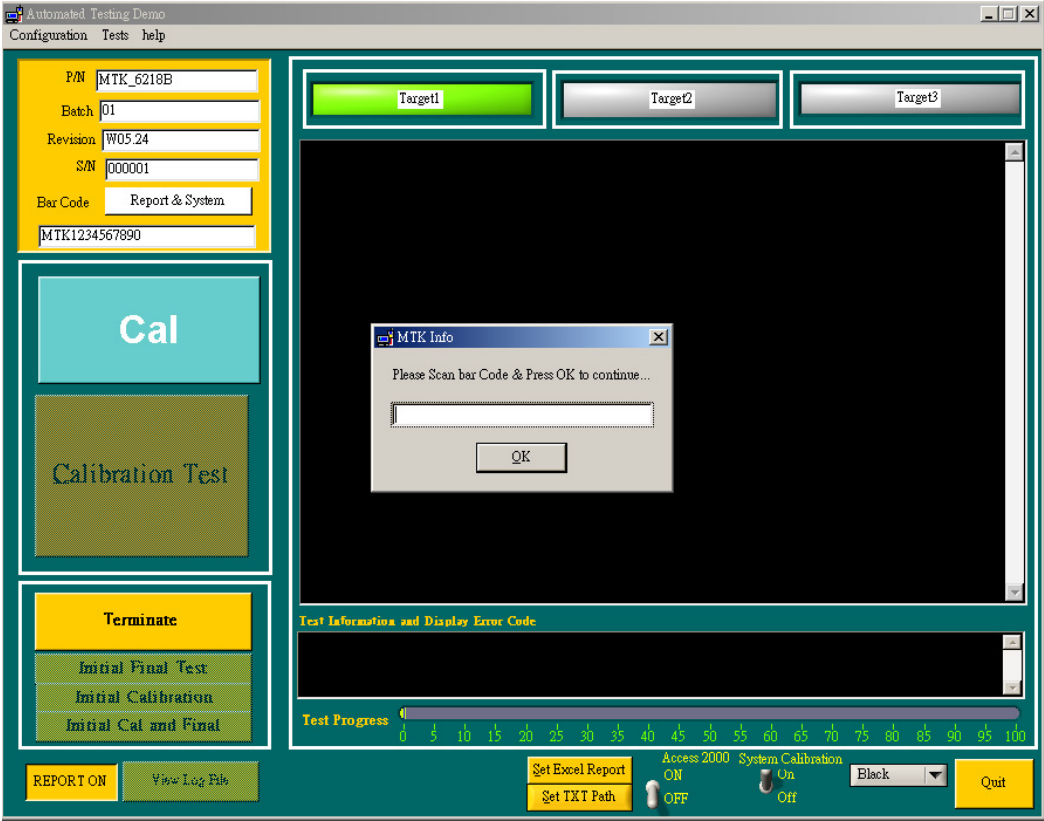
If you want calibration , you can press “initial calibration”



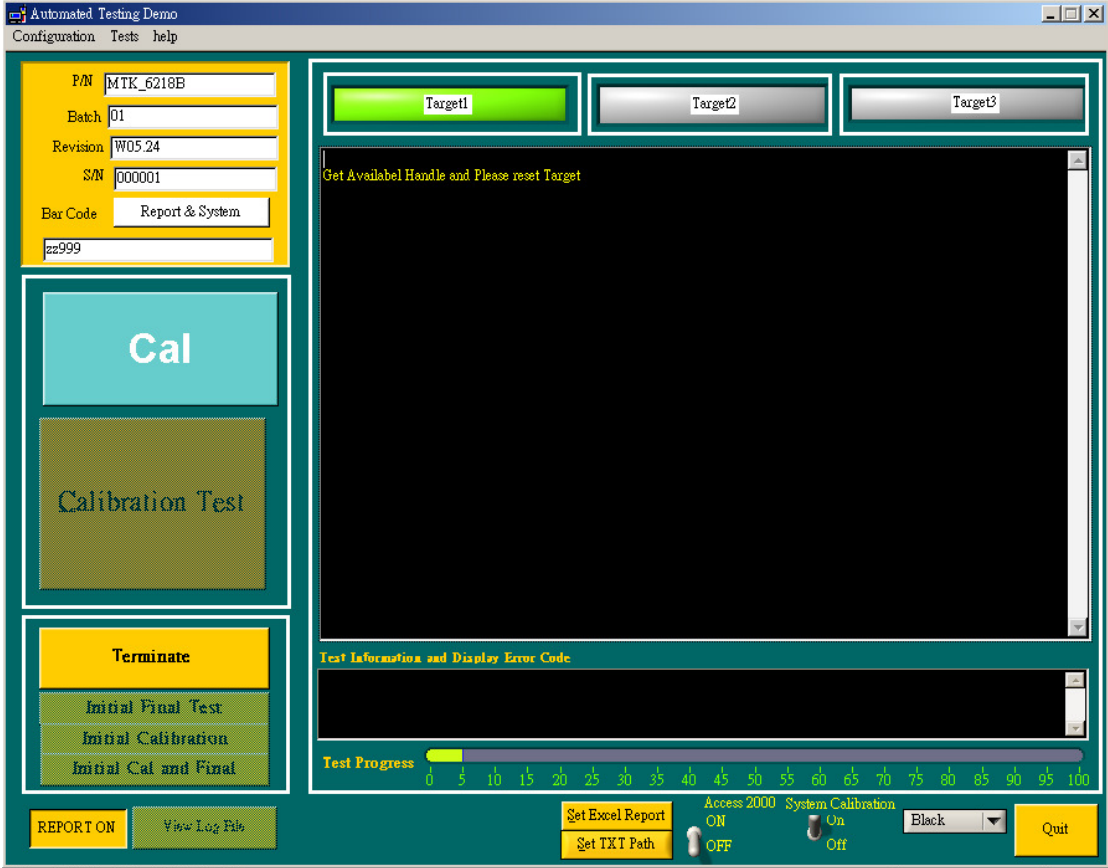
Press Calibration Test



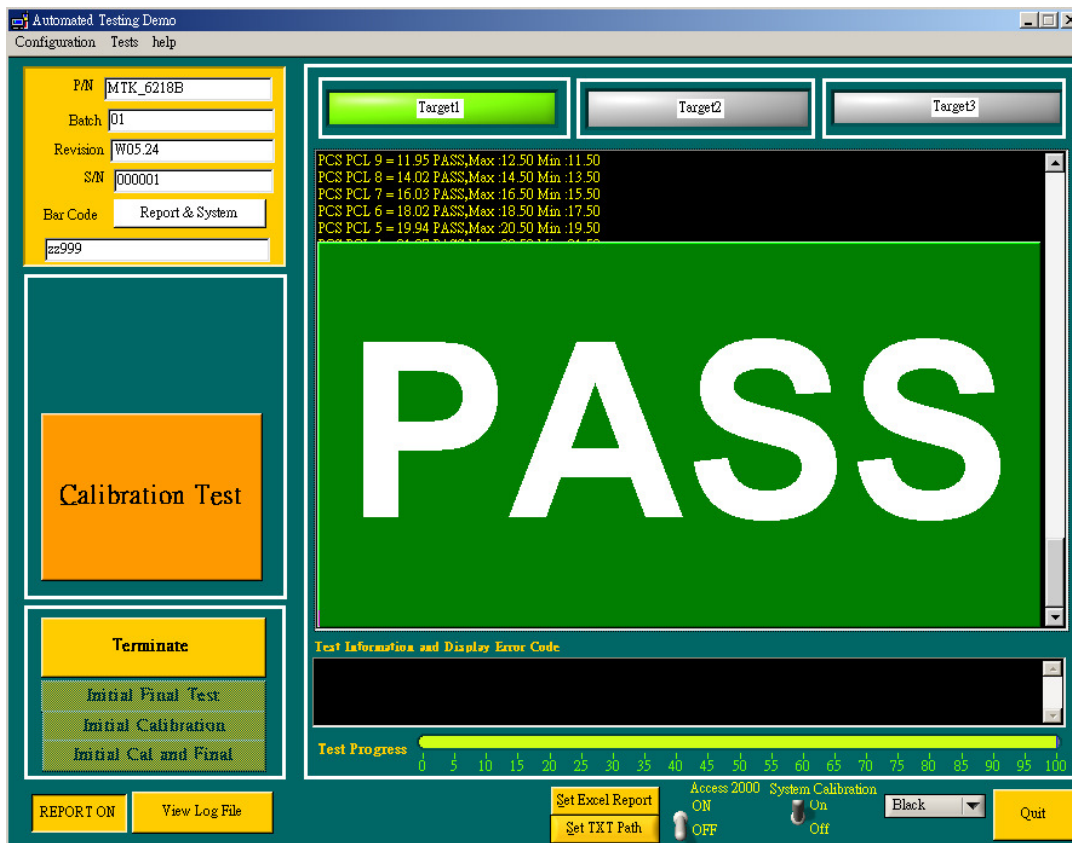
Key-in your phone bar Code



Press your phone of power on key and Start calibration



Calibration is ok and will show “PASS”



You can see the test report

```
-----
ATE Tool Version:5.0.3
Part Number: MTK_6218B
Serial Number: 000001
Revision: W05.24
Batch: 01
Bar Code: qq9
Error Code: 000
-----
```

```
==>Wait GSM Location Update .....
Enter into META Mode OK
AFC Calibration OK
Slope=2.824,min:1.000,max:10.000
Use Default Value=3836
AFC Calibration time=1.64(sec)
PL GSM TCH 15 = 1.25 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 30 = 1.00 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 45 = 0.88 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 60 = 1.25 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 75 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 80 = 1.50 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 100 = 1.25 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 124 = 1.25 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 975 = 1.50 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 1000 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 1023 = 1.00 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 550 = 0.50 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 590 = 1.00 Pass MAX:3.00 MIN:-3.00
```

If you want final test , you can press “initial final test “

Automated Testing Demo

Configuration Tests help

P/N MTK\_6218B

Batch 01

Revision W05.24

S/N 000001

Bar Code Report & System

MTK1234567890

Target1 Target2 Target3

Test Information and Display Error Code

Test Progress

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Terminate

Initial Final Test

Initial Calibration

Initial Cal and Final

REPORT ON View Log File

Set Excel Report

Set TXT Path

Access 2000 ON

System Calibration On

Black

Quit



Press "RF Final test"

Automated Testing Demo  
Configuration Tests help

P/N: MTK\_6218B  
Batch: 01  
Revision: W05.24  
S/N: 000001  
Bar Code: Report & System  
MTK1234567890

**Terminate**

**RF Final Test**

**Terminate**  
Initial Final Test  
Initial Calibration  
Initial Cal and Final

Target1 Target2 Target3

==> Wait for Init RadioCommunication Tester,.....  
==> Setting PCS1900 Ok.....  
==> Setting GSM1800 Ok.....  
==> Setting GSM900 Unit Ok.....  
==> Enable System GSM900 Ok.....  
==> Wait GSM Location Update .....  
Initial Signalling Time = 5.0

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

REPORT ON View Log File

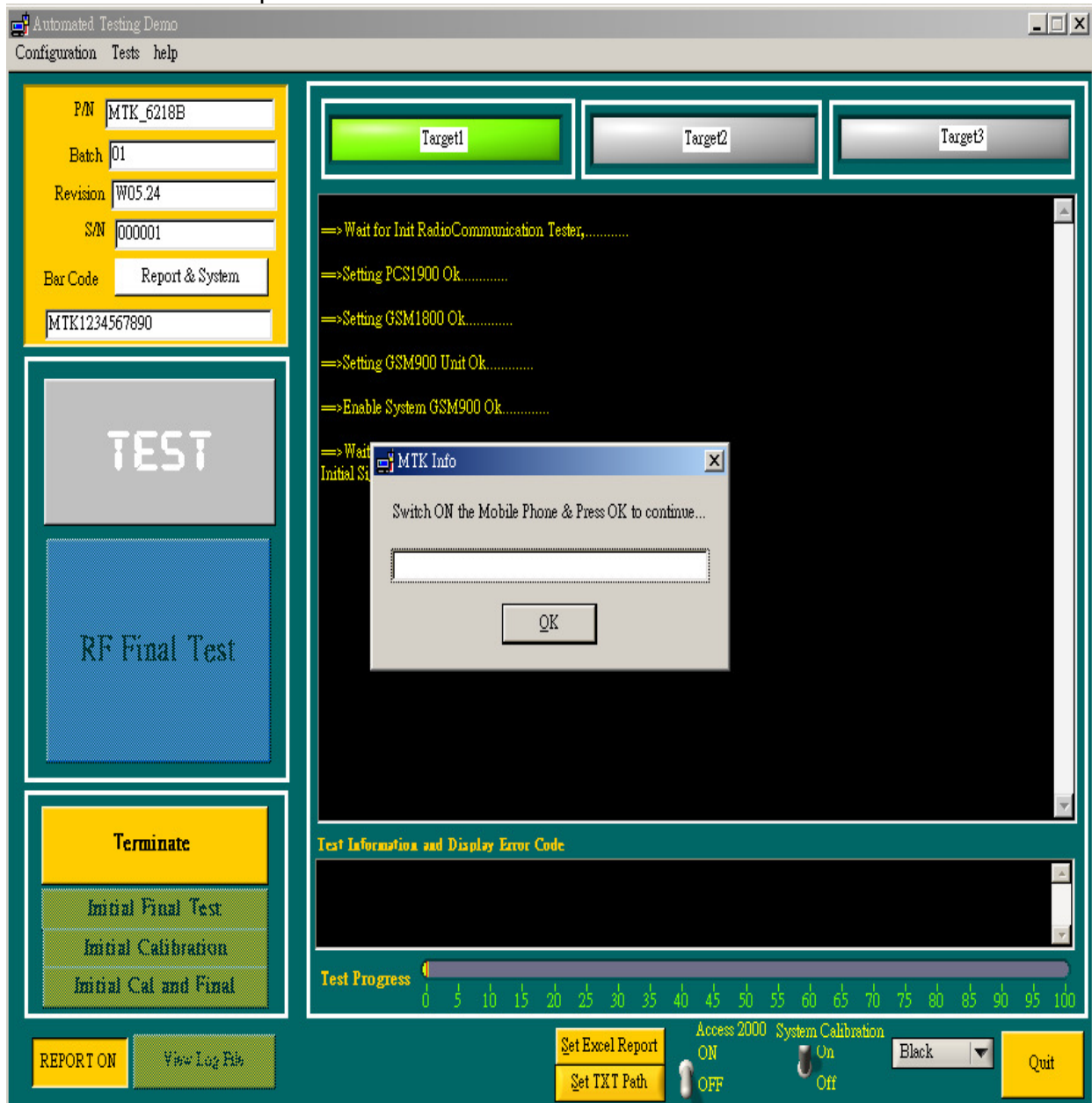
Set Excel Report Set TXT Path

Access 2000 ON OFF System Calibration On Off

Black Quit



1. Handset to insert SIM card
2. Key-in bar code or IMEI number
3. power on handset



## ATE start final test

Automated Testing Demo  
Configuration Tests help

P/N MTK\_6218B  
Batch 01  
Revision W05.24  
S/N 000001  
Bar Code Report & System  
zz999

**TEST**

**RF Final Test**

**Terminate**

Initial Final Test  
Initial Calibration  
Initial Cal and Final

REPORT ON View Log File

Set Excel Report  
Set TXT Path

Access 2000 ON OFF  
System Calibration On Off

Black Quit

Target1 Target2 Target3

GSM Band TCH 124, PCL 5

Avg. Burst Power (Avg.) [dBm] = 32.228660 Pass  
Peak Burst Power [dBm] = 32.228660 Pass  
Burst Power Matching = 0 Pass  
Maximum phase error peak [deg] = 5.259489 Pass  
Maximum phase error RMS [deg] = 2.343793 Pass  
Maximum frequency error [Hz] = -20.146050 Pass  
Timing Advance error = 0.000000 Pass  
Rx Level = 29 Pass  
Rx Quality = 0 Pass  
Class II = 0.029904 Pass  
Class Ib = 0.000000 Pass  
Modulation +400kHz = -66.839870  
Modulation -400kHz = -65.896740 PASS  
Modulation +600kHz = -68.604150  
Modulation -600kHz = -69.584160 PASS  
Modulation +1.2MHz = -71.047200  
Modulation -1.2MHz = -70.857630 PASS  
Modulation +1.8MHz = -78.453870  
Modulation -1.8MHz = -79.476660 PASS  
Modulation = 0 Pass  
Switching +400kHz = -31.559020  
Switching -400kHz = -30.744700 PASS  
Switching +1.8MHz = -43.066520  
Switching -1.8MHz = -40.874710 PASS  
Switching = 0 Pass

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

If ATE test finish , ATE will show pass



You can see the test report

```
-----  
ATE Tool Version:5.0.3  
Part Number: MTK_6218B  
Serial Number: 000001  
Revision: W05.24  
Batch: 01  
Bar Code: qqq  
Error Code: 000  
-----
```

```
==>Wait GSM Location Update .....  
Enter into META Mode OK  
AFC Calibration OK  
Slope=2.824,min:1.000,max:10.000  
Use Default Value=3836  
AFC Calibration time=1.64(sec)  
PL GSM TCH 15 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 30 = 1.00 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 45 = 0.88 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 60 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 75 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 80 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 100 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 124 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 975 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 1000 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 1023 = 1.00 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 550 = 0.50 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 590 = 1.00 Pass MAX:3.00 MIN:-3.00
```

If you want initial cal and final test , you can press “initial cal and final test”

Automated Testing Demo

Configuration Tests help

P/N MTK\_6218B

Batch 01

Revision W05.24

S/N 000001

Bar Code Report & System

MTK1234567890

Target1 Target2 Target3

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Access 2000 ON OFF

System Calibration On Off

Black

Quit

REPORT ON View Log File

Set Excel Report

Set TXT Path

Initial Cal and Final

Press "Cal & Final"

Automated Testing Demo

Configuration Tests help

P/N MTK\_6218B

Batch 01

Revision W05.24

S/N 000001

Bar Code Report & System

MTK1234567890

Terminate

Cal & Final

Terminate

Initial Final Test

Initial Calibration

Initial Cal and Final

Target1 Target2 Target3

Test Information and Display Error Code

Test Progress

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

- 1.Handset to insert SIM card
- 2.Key-in bar code or IMEI number
- 3.Power on handset

Automated Testing Demo  
Configuration Tests help

P/N   
Batch   
Revision   
S/N   
Bar Code

**Cal**

**Cal & Final**

**Terminate**

**Initial Final Test**  
**Initial Calibration**  
**Initial Cal and Final**

Target1 Target2 Target3

MTK Info  
Please Scan bar Code & Press OK to continue...  
  
OK

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

## Start calibration

Automated Testing Demo  
Configuration Tests help

P/N: MTK\_6218B  
Batch: 01  
Revision: W05.24  
S/N: 000001  
Bar Code: Report & System  
zz999

**Cal**

**Cal & Final**

**Terminate**

Initial Final Test  
Initial Calibration  
Initial Cal and Final

Target1 Target2 Target3

```

PL DCS TCH 710 = 0.00 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 740 = 0.00 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 770 = 0.25 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 810 = 0.50 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 850 = 0.38 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 885 = 0.50 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 550 = 1.25 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 590 = 1.12 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 620 = 1.12 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 650 = 1.12 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 680 = 1.25 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 710 = 1.25 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 740 = 1.50 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 770 = 1.38 Pass MAX:3.00 MIN:-3.00
PL PCS TCH 810 = 1.62 Pass MAX:3.00 MIN:-3.00
Path Loss Calibration OK
Pathloss Calibration time=8.31(sec)
-----GSM900 APC Cal-----
delta s = 0
Cal APC Power:19.03
delta s = 0
Cal APC Power:32.24
-----DCS1800 APC Cal-----
delta s = 0
Cal APC Power:13.96
delta s = 0
Cal APC Power:29.20
-----PCS1900 APC Cal-----
  
```

**Test Information and Display Error Code**

**Test Progress** 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100



Calibration finish and power on handset again

Automated Testing Demo  
Configuration Tests help

P/N: MTK\_6218B  
Batch: 01  
Revision: W05.24  
S/N: 000001  
Bar Code: Report & System  
999

**TEST**

Cal & Final

Terminate

Initial Final Test  
Initial Calibration  
Initial Cal and Final

REPORT ON View Log File

Set Excel Report  
Set TXT Path

Access 2000 System Calibration  
ON OFF On Off

Black Quit

Target1 Target2 Target3

Enter into META Mode OK  
AFC Calibration OK  
Slope=2.816,min:1.000,max:10.000  
Use Default Value=3803  
AFC Calibration time=1.67(sec)  
PL GSM TCH 15 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 30 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 45 = 0.88 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 60 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 75 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 80 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 100 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 124 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 975 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 1000 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL GSM TCH 1023 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 550 = 0.62 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 590 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 620 = 1.00 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 650 = 0.62 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 680 = 0.25 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 710 = 0.12 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 740 = 0.12 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 770 = 0.25 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 810 = 0.62 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 850 = 0.38 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 885 = 0.62 Pass MAX:3.00 MIN:-3.00

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

## Start final test

Automated Testing Demo
Configuration Tests help

P/N MTK\_6218B  
Batch 01  
Revision W05.24  
S/N 000001  
Bar Code Report & System  
zz999

Cal

Cal & Final

Terminate

Initial Final Test  
Initial Calibration  
Initial Cal and Final

Target1 Target2 Target3

PL DCS TCH 710 = 0.00 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 740 = 0.00 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 770 = 0.25 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 810 = 0.50 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 850 = 0.38 Pass MAX:3.00 MIN:-3.00  
PL DCS TCH 885 = 0.50 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 550 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 590 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 620 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 650 = 1.12 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 680 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 710 = 1.25 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 740 = 1.50 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 770 = 1.38 Pass MAX:3.00 MIN:-3.00  
PL PCS TCH 810 = 1.62 Pass MAX:3.00 MIN:-3.00  
Path Loss Calibration OK  
Pathloss Calibration time=8.31(sec)  
-----GSM900 APC Cal-----  
delta s = 0  
Cal APC Power:19.03  
delta s = 0  
Cal APC Power:32.24  
-----DCS1800 APC Cal-----  
delta s = 0  
Cal APC Power:13.96  
delta s = 0  
Cal APC Power:29.20  
-----PCS1900 APC Cal-----

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Finish "Cal & Final test"

Automated Testing Demo  
Configuration Tests help

P/N: MTK\_6218B  
Batch: 01  
Revision: W05.24  
S/N: 000001  
Bar Code: Report & System  
qq88

Cal & Final

Terminate  
Initial Final Test  
Initial Calibration  
Initial Cal and Final

REPORT ON View Log File

Target1 Target2 Target3

PCS Band TCH 810, PCL 0  
Avg. Burst Power (Avg.) [dBm] = 29.143900 Pass  
Peak Burst Power [dBm] = 29.143900 Pass

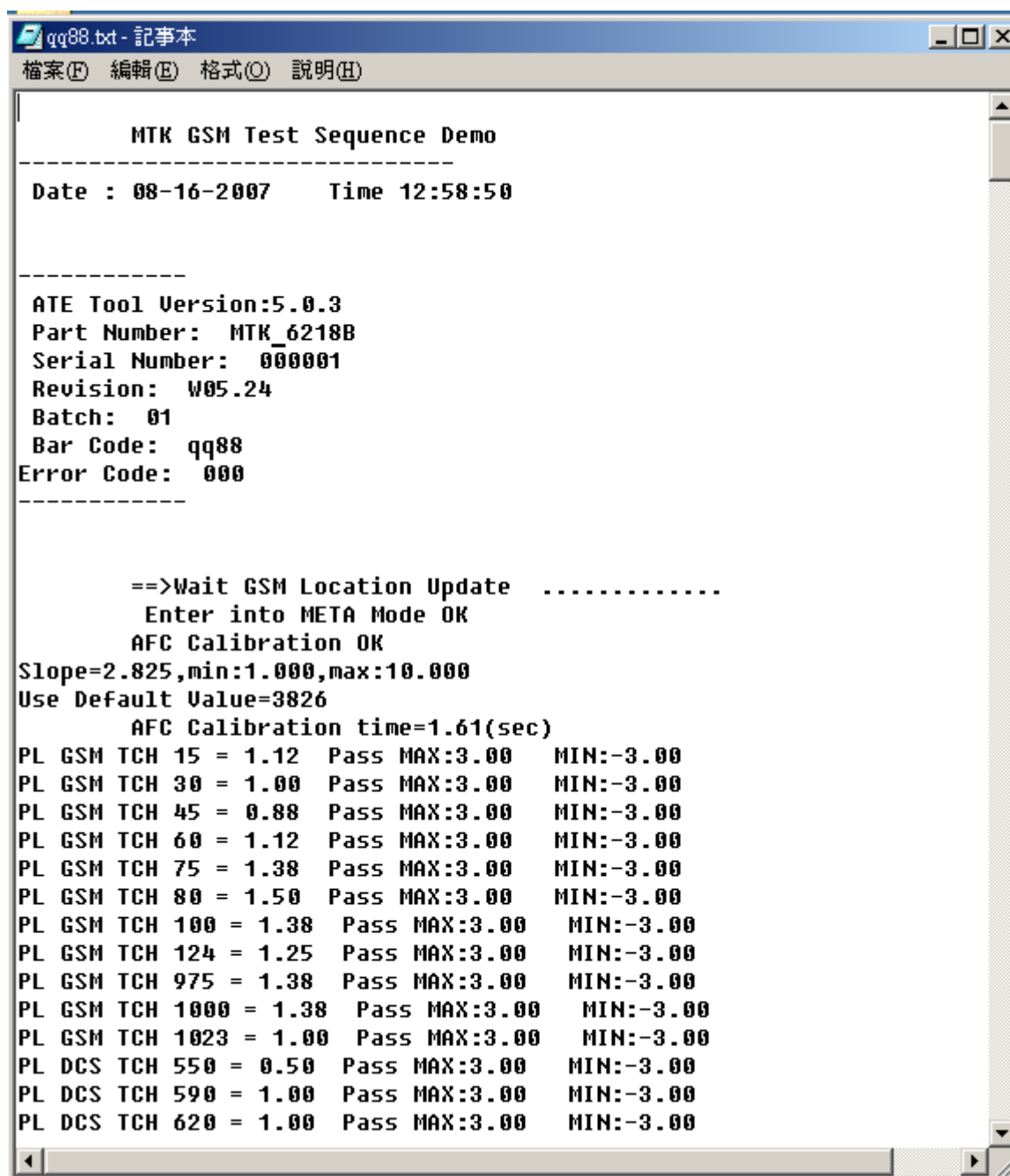
**PASS**

Test Information and Display Error Code

Test Progress 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Set Excel Report Access 2000 System Calibration  
ON ON Black  
Set TXT Path OFF Off Quit

Ate show the test report



```
qq88.txt - 記事本
檔案(F) 編輯(E) 格式(O) 說明(H)

MTK GSM Test Sequence Demo
-----
Date : 08-16-2007    Time 12:58:50

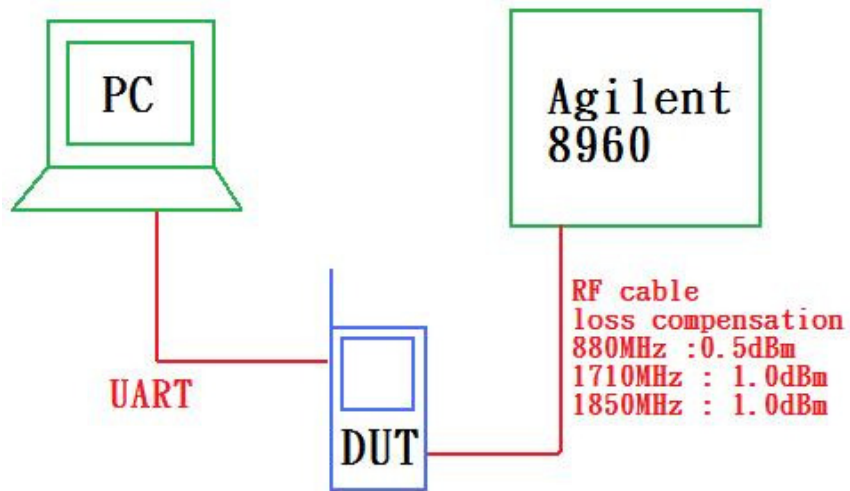
-----
ATE Tool Version:5.0.3
Part Number:  MTK_6218B
Serial Number: 000001
Revision:  W05.24
Batch:  01
Bar Code:  qq88
Error Code: 000
-----

==>Wait GSM Location Update .....
Enter into META Mode OK
AFC Calibration OK
Slope=2.825,min:1.000,max:10.000
Use Default Value=3826
AFC Calibration time=1.61(sec)
PL GSM TCH 15 = 1.12 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 30 = 1.00 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 45 = 0.88 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 60 = 1.12 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 75 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 80 = 1.50 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 100 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 124 = 1.25 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 975 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 1000 = 1.38 Pass MAX:3.00 MIN:-3.00
PL GSM TCH 1023 = 1.00 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 550 = 0.50 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 590 = 1.00 Pass MAX:3.00 MIN:-3.00
PL DCS TCH 620 = 1.00 Pass MAX:3.00 MIN:-3.00
```

## 12. STAND ALONE TEST

### 12.1 Test Configuration & Expected Outcome

#### Test Configuration :



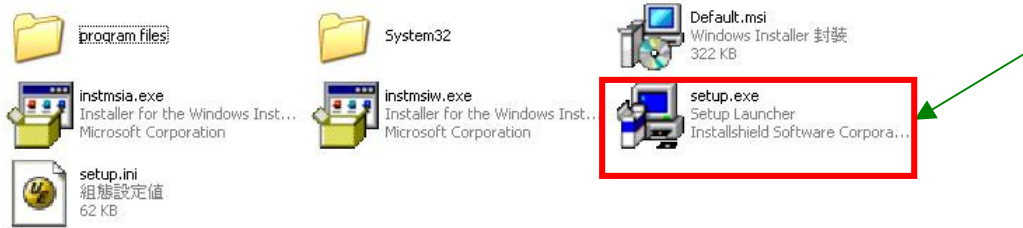
#### Expected Outcome :

|    |       |        |     |         |                              |
|----|-------|--------|-----|---------|------------------------------|
| TX | power | : 32.5 | +/- | 1.5 dBm | for GSM900                   |
| TX | power | : 29.5 | +/- | 1.5 dBm | for DCS1800, PCS1900         |
| RX | power | : -85  | +/- | 4 dBm   | for GSM900, DCS1800, PCS1900 |

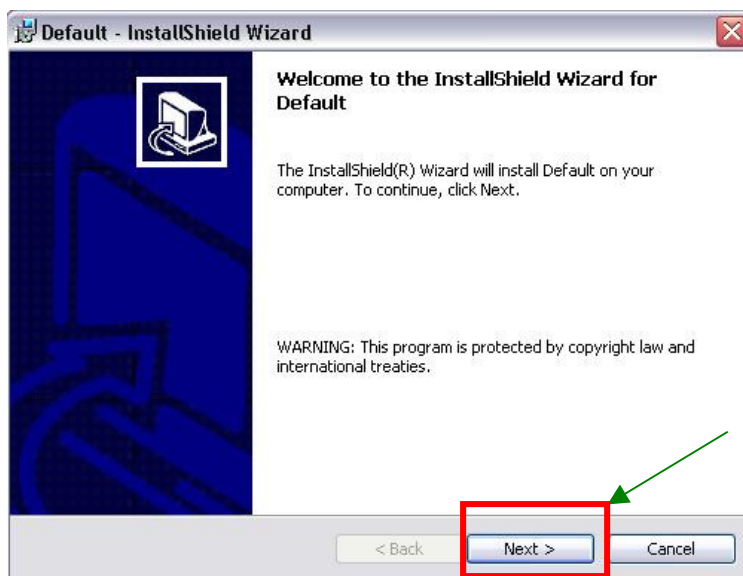
## 12.2 META Install & RF TX & RX Check

### META Tool Install process :

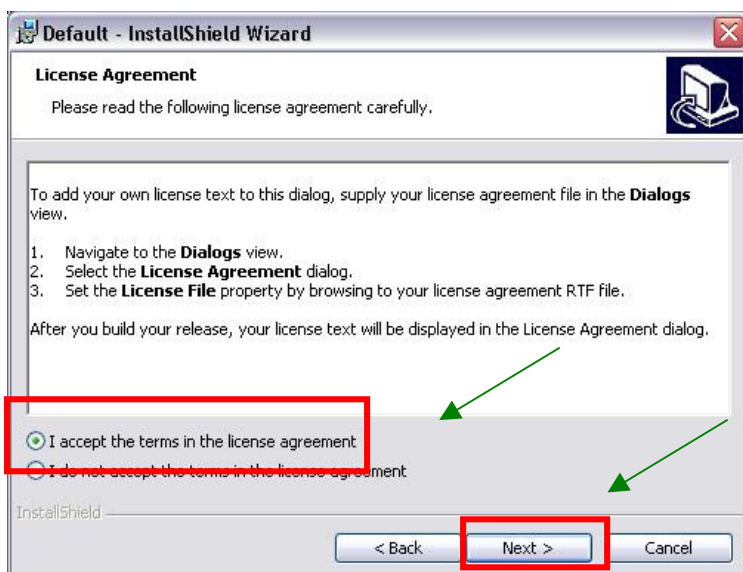
#### (1) Press “setup.exe” then press



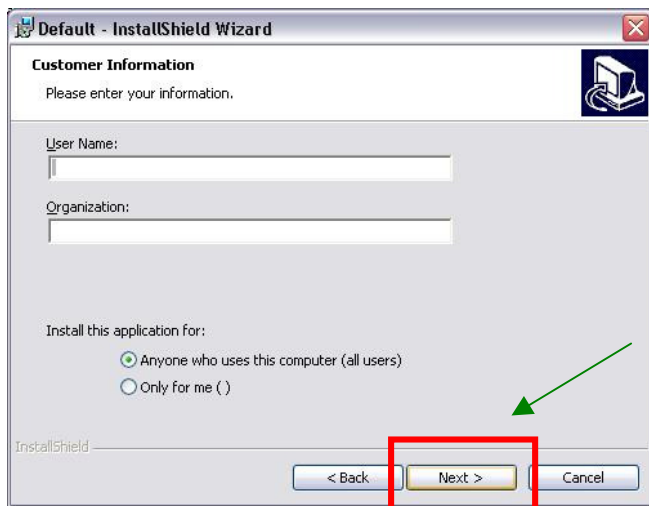
#### (2) Install Process – press “Next”



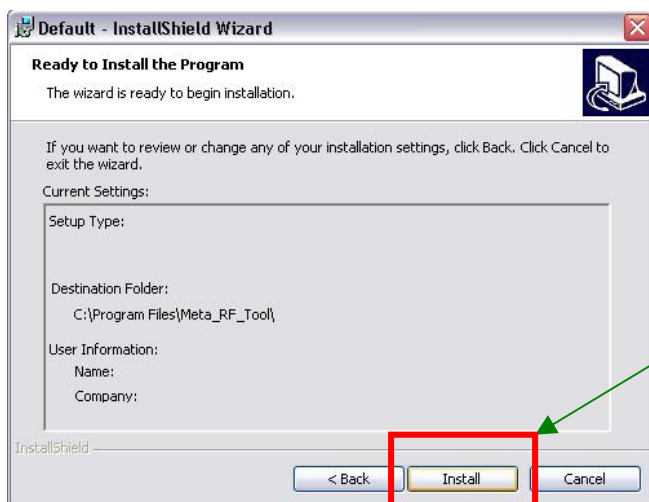
#### (3) Install Process – press “Next”



#### (4) Install Process – press “Next”



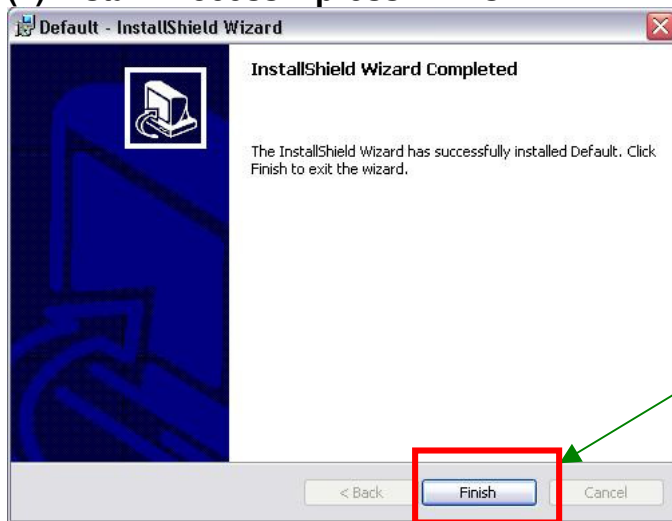
#### (5) Install Process – press “Next”



#### (6) Install Process



## (7) Install Process – press “Finish”





### 12.3 RF RX Check :

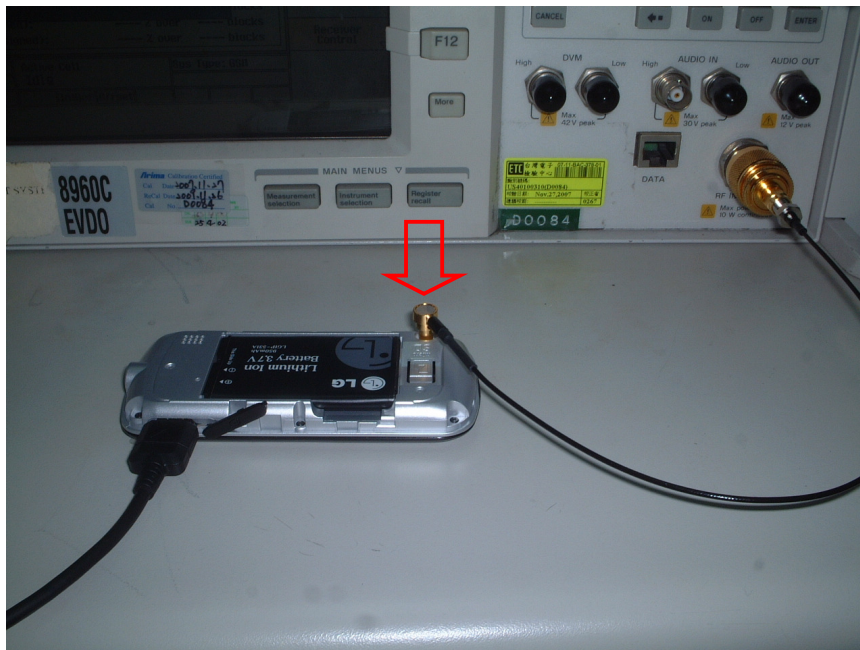
(1) Open “ Meta\_RF\_Tool ”



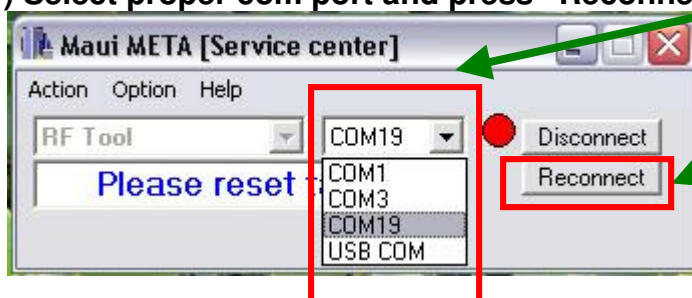
(2) Pull in UART cable



(3) Inset RF-Cable (AG8960)



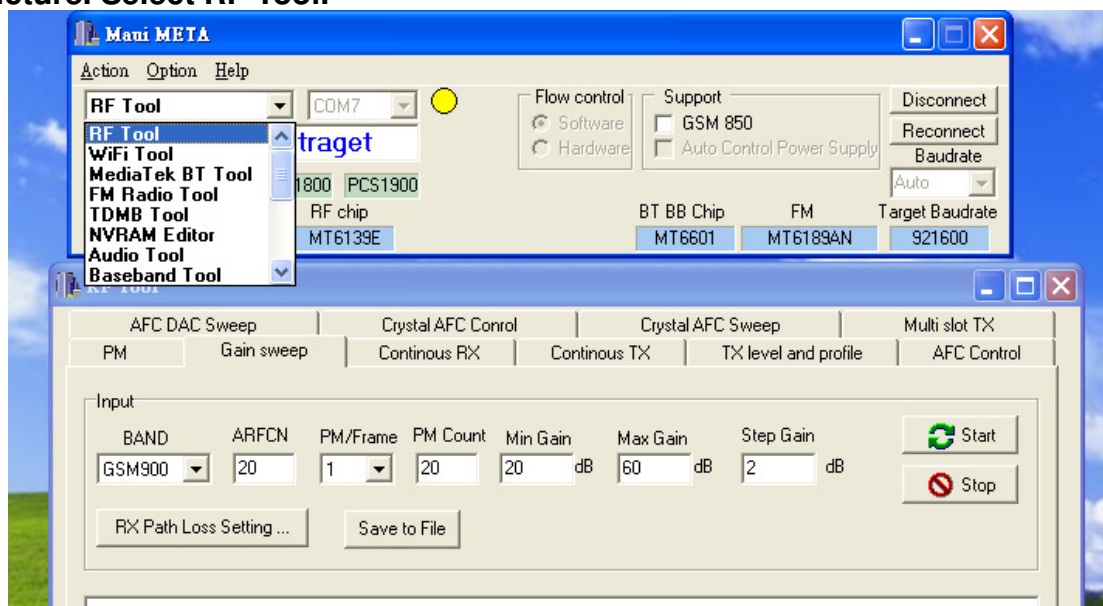
(4) Select proper com port and press “Reconnect”



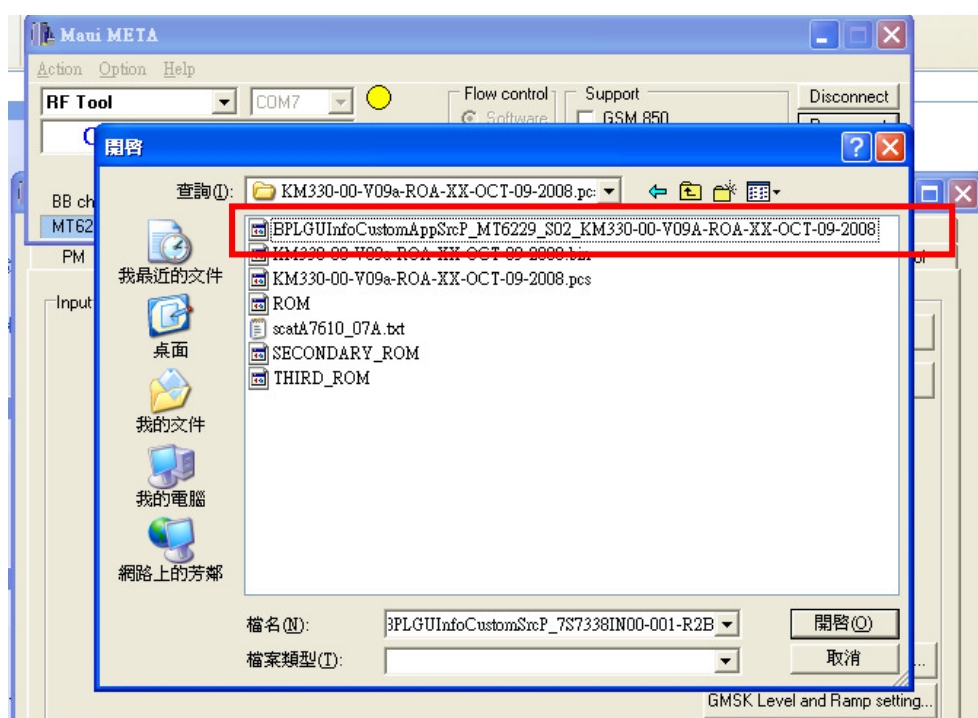
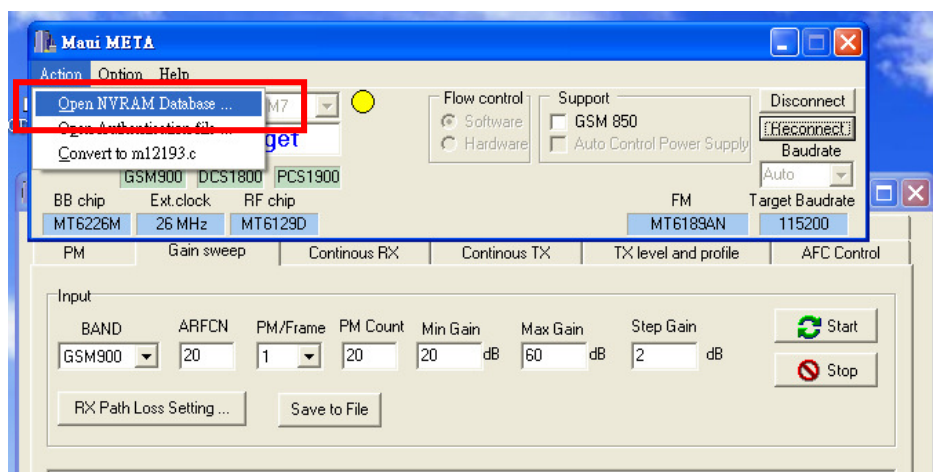
Step1

Step2

(5) Press handset's power key and it will show LG logo. Then appear the following picture. Select RF Tool.

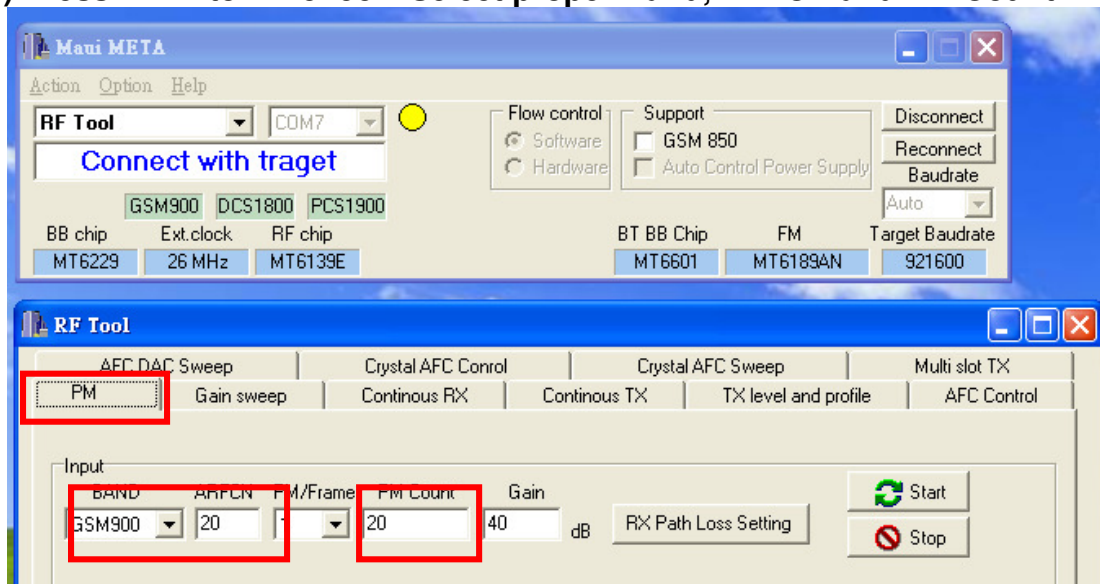


(6) Loading database Make sure the same to handset.

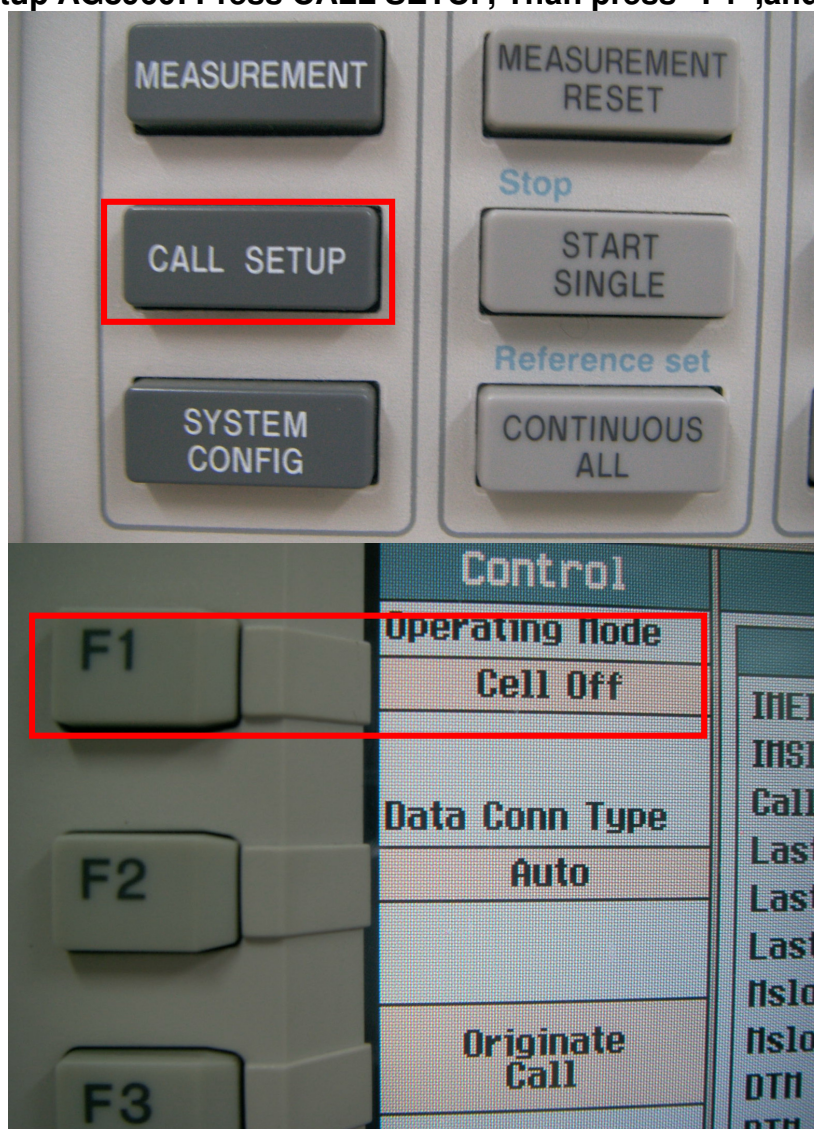


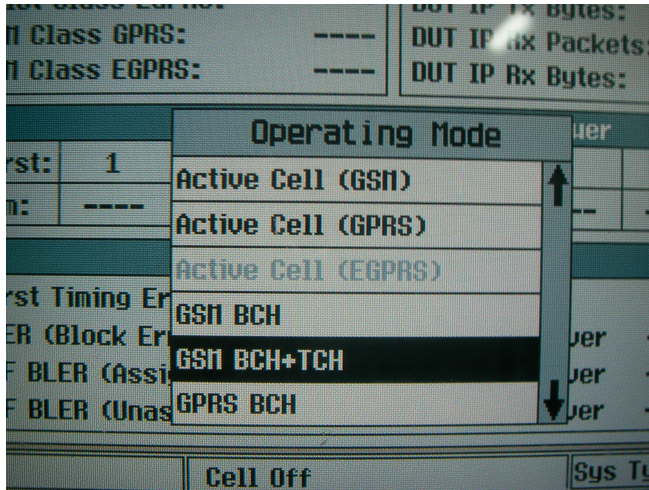


(7) Press “PM” to RX check. Select proper Band, ARFCN and PM Count.

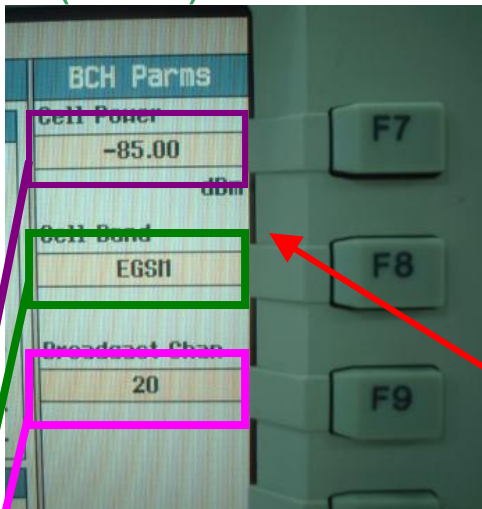


(8) Setup AG8960: Press CALL SETUP, Than press “F1”,and select “GSM BCH+TCH”.





(9) **RX Test (AG8960)**--- Set "BCH Params",



(10) **RX Test** --- Press Start then Only check top 5 items

| BAND   | ARFCN | DSP Power | Ant. Power | Used Gain | Deviation | I_DC | Q_DC | Valid sample |
|--------|-------|-----------|------------|-----------|-----------|------|------|--------------|
| GSM900 | 20    | -65.375   | -84.625    | 19.250    | 2.298     | -5   | -27  | 20           |
| GSM900 | 20    | -63.375   | -84.625    | 21.250    | 4.241     | 10   | -36  | 20           |
| GSM900 | 20    | -61.250   | -84.500    | 23.250    | 4.481     | -9   | -53  | 20           |
| GSM900 | 20    | -59.375   | -84.625    | 25.250    | 3.252     | -4   | -12  | 20           |
| GSM900 | 20    | -57.500   | -84.750    | 27.250    | 2.301     | -14  | -19  | 20           |

1. Select Band (GSM/DCS/PCS)
2. Set channel members
3. Press "Start"

Check first 5 items, need +/- 4 inside

## 12.4 RF TX Check :

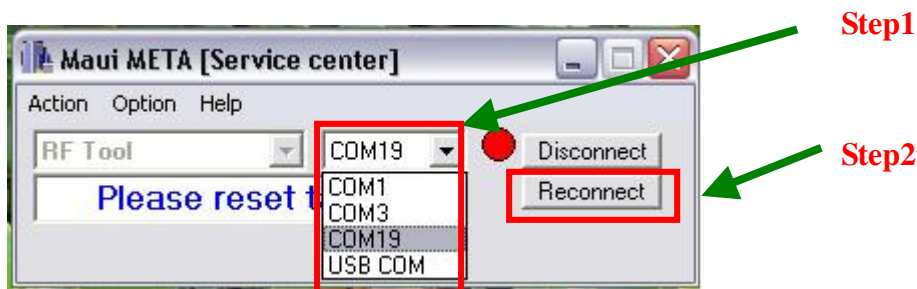
(1) Open “ Meta\_RF\_Tool ”.



(2) Pull in UART cable.

(3) Inset RF-Cable (AG8960).

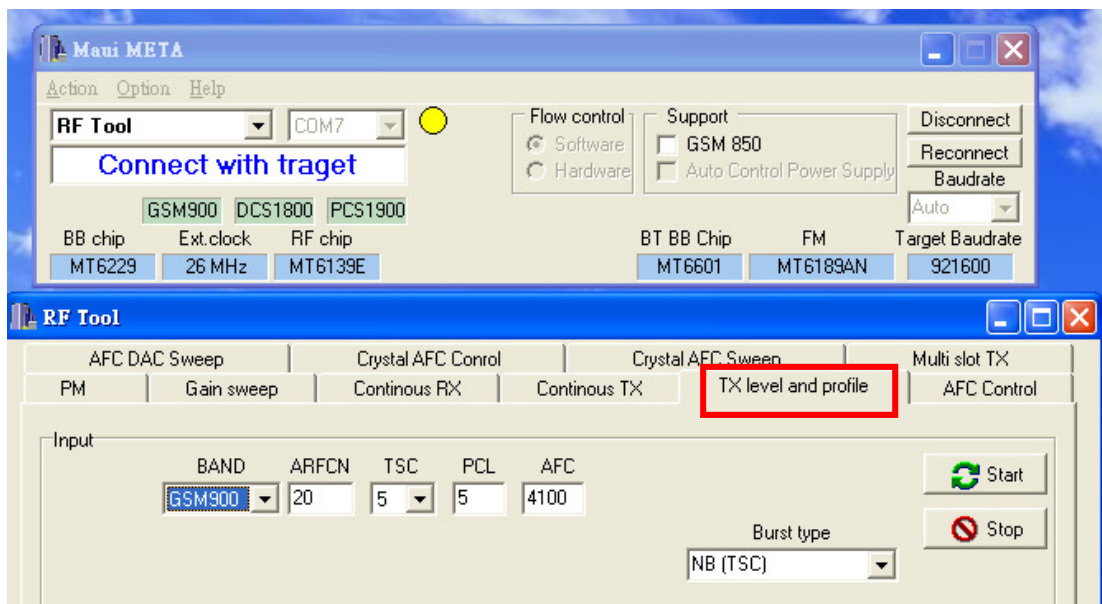
(4) Select proper com port and press “Reconnect” and then press handset’s power key.



(5) Loading database Make sure the same to handset.

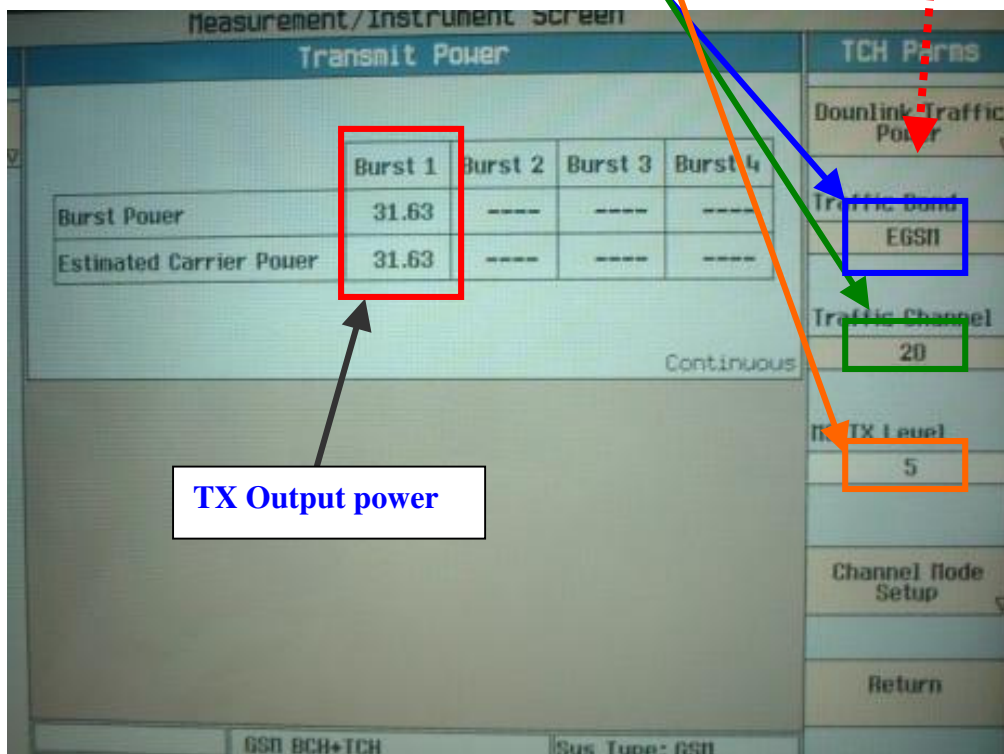
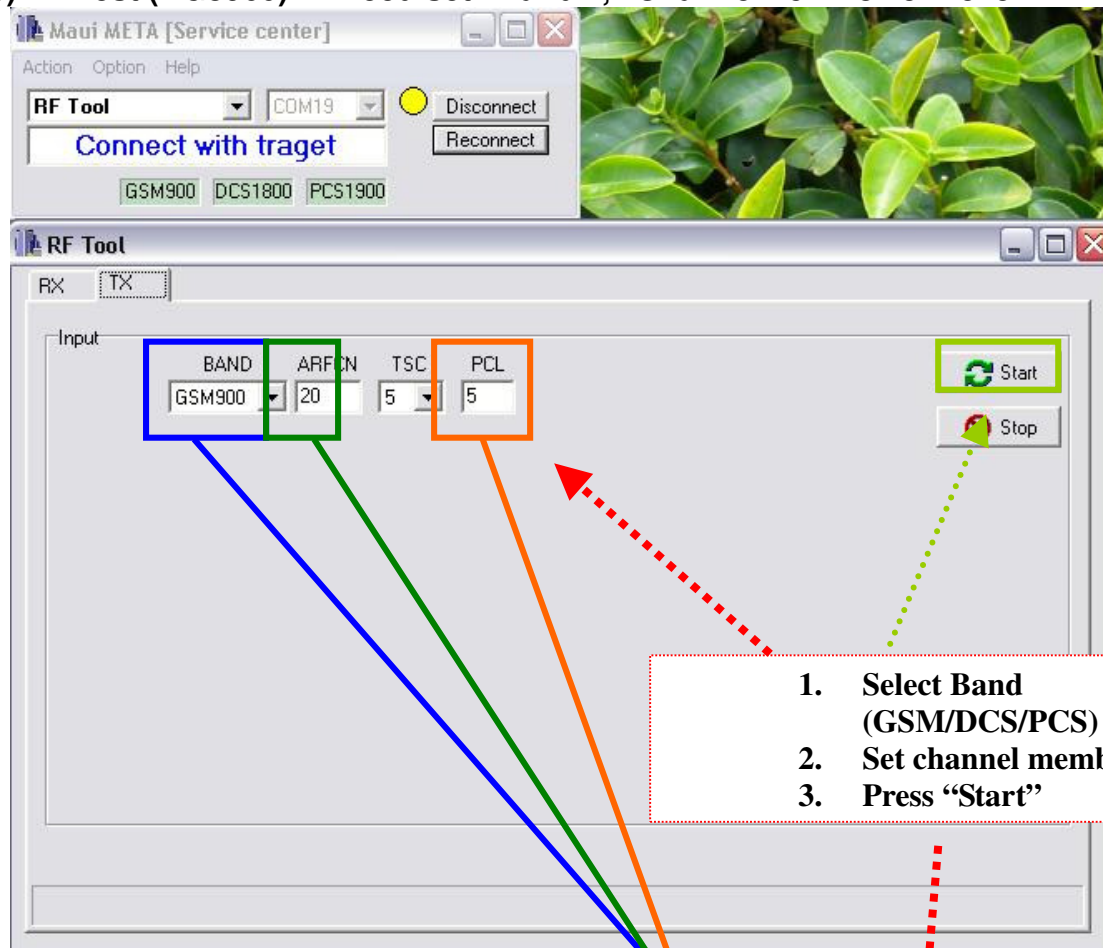
(6) AG8960 need to set TCH Parms.

(7) Press “TX level and profile” to TX Test.





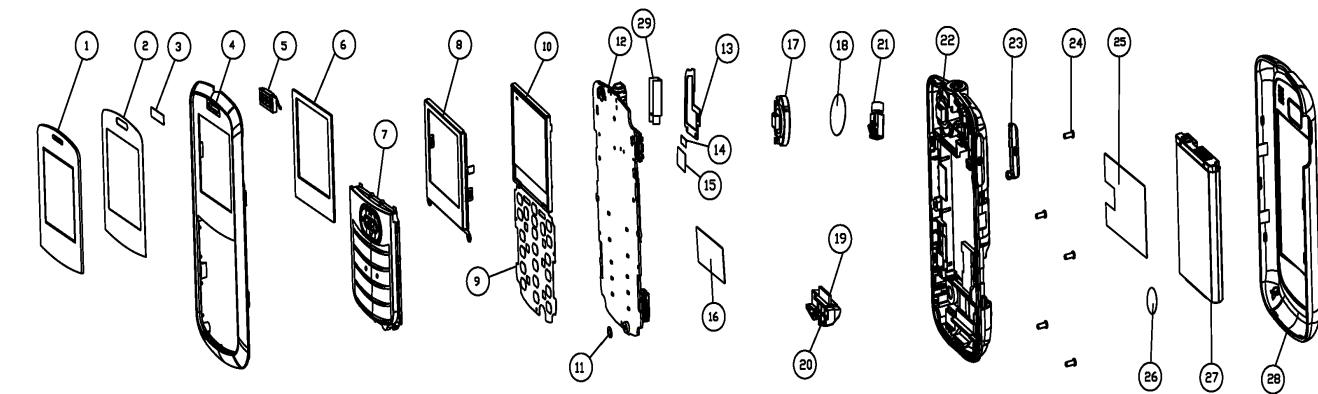
**(8) TX Test (AG8960) --- Need set “Band” , “Channel” & “Power Level”**



# 13. EXPLODED VIEW&REPLACEMENT PART LIST

## 13.1 Exploded view

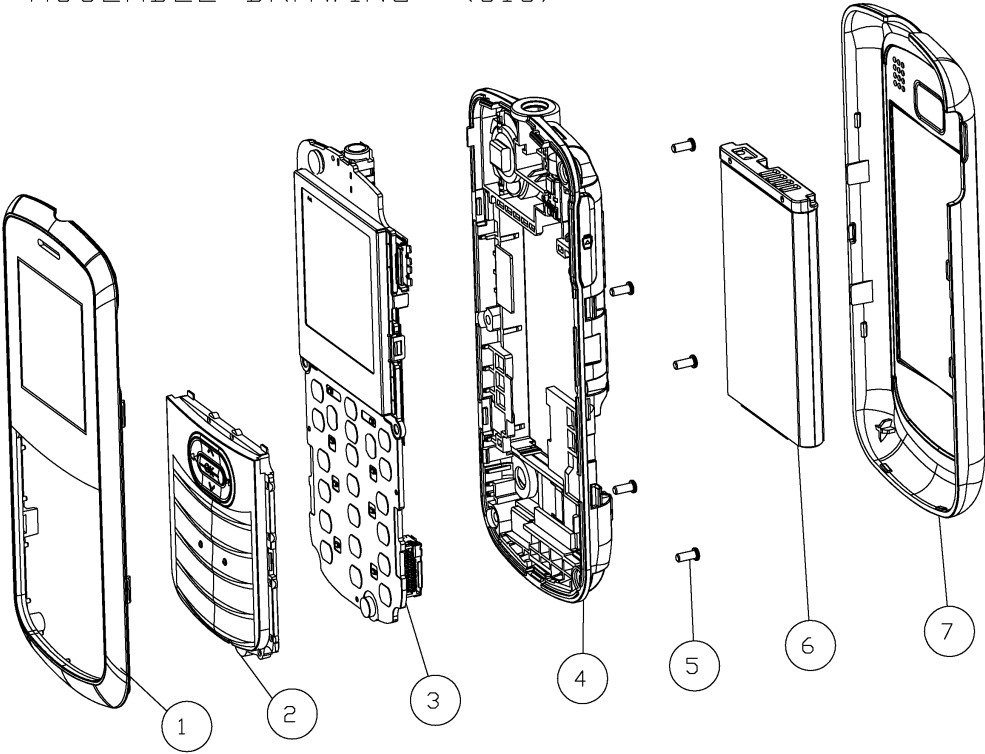
GB170 FULL ASSEMBLE DRAWING (CIS)



|     |                     |                 |      |             |             |
|-----|---------------------|-----------------|------|-------------|-------------|
| 29  | Kapton For Earphone | 415-72130-0018  | 1    | MTA20252501 |             |
| 28  | BATTERY COVER       | 405-72130-0001  | 1    | MCJA009001  |             |
| 27  | BATTERY             | 306-0000-00060  | 1    | SBPL0090501 |             |
| 26  | RF CAP              | 415-72130-0013  | 1    | MCCF0062701 |             |
| 25  | LABEL APPROVAL      | 7L-72132000-01  | 1    | MLAA0065701 |             |
| 24  | SCREW               | 409-00000-0090  | 5    | GNEY0023101 |             |
| 23  | I/O COVER           | 405-72130-0003  | 1    | MCC0051301  |             |
| 22  | REAR COVER (RED)    | 402-72130-0001  | 1    | MCJN0104502 |             |
| 21  | VIBRATOR            | 320-0000-00047  | 1    | SJMY0009601 |             |
| 20  | ANTENNA FPCB        | 330-0000-00161  | 1    | SNGF0053101 |             |
| 19  | ANT. CARRIER        | 415-72130-0008  | 1    | NFEZ0022901 |             |
| 18  | SPEAKER MESH        | 415-72130-0002  | 1    | WFB0053801  |             |
| 17  | SPEAKER             | 313-0000-00140  | 1    | SUSY0029501 |             |
| 16  | MYLAR FOR RF SHIELD | 415-72130-0019  | 1    | MTAC0096201 | Change part |
| 15  | Mylar LCN FPC conn. | 415-72130-0003  | 1    | MTAJ0023601 |             |
| 14  | WATER PROOF PAPER   | 478-221100-003  | 1    | MLAB0006001 |             |
| 13  | SPEAKER SPONGE      | 415-72190-0001  | 1    | MGAZ0072701 |             |
| 12  | PCBA ASM            | 8M00-7213-N001  | 1    | SAFY0349201 |             |
| 11  | MIC MESH            | 415-72130-0016  | 1    | WFB00040501 |             |
| 10  | LCM                 | 327-0000-00081  | 1    | SVLM0037101 |             |
| 9   | METAL DOME ASM      | 415-72130-0012  | 1    | ADCA0102101 |             |
| 8   | LCM SHIELDING       | 415-72130-0007  | 1    | MCBA0055901 |             |
| 7   | KEYPAD (RUSSIA)     | 404-72130-0002  | 1    | MKAG0017002 |             |
| 6   | FRONT COVER SPONGE  | 415-72130-0009  | 1    | WFB00095101 |             |
| 5   | RECEIVER            | 313-0000-00133  | 1    | SJMY0010001 |             |
| 4   | FRONT COVER         | 401-72130-0001  | 1    | MCJK0108101 |             |
| 3   | RECEIVER MESH       | 415-72130-0011  | 1    | WFB00032101 |             |
| 2   | MAIN LENS TAPE      | 415-72130-0010  | 1    | MTAD0109701 |             |
| 1   | MAIN LENS           | 403-72130-0004  | 1    | HWAC0121302 |             |
| NO. | ITEM                | ARTIMA PART NO. | Q'TY | LG PART NO. | Notes       |

Ass'y exploded view

GB170 ASSEMBLE DRAWING (CIS)



|     |                   |                |      |             |
|-----|-------------------|----------------|------|-------------|
| 7   | BATTERY COVER     | 405-72130-0001 | 1    | MCJA0090101 |
| 6   | BATTERY           | 306-0000-00060 | 1    | SBPL0090501 |
| 5   | SCREW             | 409-00000-0090 | 5    | GMEY0023101 |
| 4   | REAR COVER ASSY   | 8M02-7213-R001 | 1    | ACGM0136202 |
| 3   | PCB ASS'Y         | 8M08-7213-N001 | 1    | SAFY0349201 |
| 2   | KEYPAD (RUSSIA)   | 404-72130-0002 | 1    | MKAG0017002 |
| 1   | FRONT COVER ASS'Y | 8M01-7213-B002 | 1    | ACGK0137401 |
| NO. | ITEM              | ARIMA PART NO. | Q'TY | LG PART NO. |



### 13. Replacement Part list

| No | Level   | Location                | Arima part number | LG part number | Description   | Qty |
|----|---------|-------------------------|-------------------|----------------|---|-----|
| 1  | .. 2    | Front Cover Sub-Ass'y   | 8M01-7213-B002    | ACGK0137401    | Front Cover Sub-Ass'y_7213_BLACK_FOR LG   | 1   |
| 2  | ... 3   | KEY PAD                 | 404-72130-0002    | MKAG0017002    | Key_7213_BLACK_PC+ABS+Rubber_Painting_RUSSIA_KEYPAD_TOPBOUND_N/A                                | 1   |
| 3  | ... 3   | RECEIVER                | 313-0000-00133    | SJMY0010001    | RECEIVER_SD-1206DS-1_12.0 * 6.0mm_32 Ohm_112dB_CHANG ZHOU YU CHENG_±3dB,H=2.4mm, Spring contact | 1   |
| 4  | .. 2    | Rear Cover Sub- Ass'y   | 8M02-7213-R001    | ACGM0136202    | Rear Cover Sub- Ass'y_7213_RED_FOR RUSSIA   | 1   |
| 5  | ... 3   | LOUD SPEAKER            | 313-0000-00140    | SUSY0029501    | LOUD SPEAKER_EMS1813VFR8_13 * 18 mm_8 Ohm_89.0dB_EM-TECH_±3dB,H=3.7 mm,Spring Contact           | 1   |
| 6  | ... 3   | Vibrator                | 320-0000-00047    | SJMY0009601    | Vibrator Bar Type_Y0408A-270350122-0021C_R2.5+4.40*5.20*12.60mm_LNLON_Spring contact type       | 1   |
| 7  | .. 2    | Antenna Cover Sub-Ass'y | 8M07-7213-B001    | AANY0002201    | Antenna Cover Sub-Ass'y_7213_BLACK_FOR LG   | 1   |
| 8  | . 1     | BATTERY COVER           | 405-72130-0001    | MCJA0090101    | Cover_7213_BLACK_PC_Painting_BATTERY COVER_A-TEK PRECISION(SUZHOU)_N/A                          | 1   |
| 9  | .. 2    | Screw                   | 409-00000-0090    | GMEY0023101    | Machine Screw_Flat_Cross(JCIS)_1.6mm_3.90mm_BLACK_Steel_Plating Zinc_HNS_NYLOK                  | 5   |
| 10 | .. 2    | PCBA Sub-Ass'y          | 8M08-7213-N001    | SAFY0349201    | PCBA Sub-Ass'y_7213_NATURAL_FOR LG  | 1   |
| 11 | ..... 5 | X100                    | 305-0000-00026    | EXSY0024801    | Crystal Oscillator_Q13MC1461000200_32.768KHZ_±20ppm_SMD-7*1.5mm-4Pin_EPSON TOYO COM_MC-146 type | 1   |
| 12 | ..... 5 | BUC500                  | 306-0000-00077    | SBCL0002501    | Li. Button Battery Cell-RTC- Reflowable_3.3V_0.033mAh_NoColor_KS414F ER_KITAGAWA_N/A            | 1   |
| 13 | ..... 5 | D300,D500,D501          | 309-0000-00111    | EDSY0018501    | Diode Schottky_SDM20U40-7-F_N/A_2pin_SOD-523_250mA/40V_DIODES_N/A                               | 3   |
| 14 | ..... 5 | U100                    | 311-0000-00781    | EUSY0403001    | I.C BASEBAND PROCESSOR_MT6225A/BG-L_TFBGA_264 BALL_NoMemory_MTK_N/A                             | 1   |
| 15 | ..... 5 | U200                    | 311-0000-00766    | EUSY0395901    | I.C STACKED MEMORY_PF38F4050M0Y0CG_FBGA_107 balls_256M+64M_NUMONYX_NOR FLASH+PSRAM              | 1   |
| 16 | ..... 5 | U400                    | 311-0000-00689    | EUSY0376801    | I.C AUDIO POWER AMPLIFIER_TPA6202A1ZQVR_BGA_8 Balls_NoMemory_TI_Vo=3.6V, 0.63 W, 8 Ohm          | 1   |
| 17 | ..... 5 | U501                    | 310-0000-00005    | EQFP0010501    | P Channel-MOSFET+Schottky_AON4703_8pin_DFN_ALPHA&OMEGA_N/A                                      | 1   |
| 18 | ..... 5 | U502                    | 311-0000-00021    | EUSY0361901    | I.C POWER MANAGEMENT UNIT(PMU)_MT6318A/DY-L_TFBGA_96 Balls_NoMemory_MTK_N/A                     | 1   |
| 19 | ..... 5 | U600                    | 311-0000-00600    | SMZY0024701    | I.C POWER AMP MODULE(RF)_SKY77518-21_MCM_20 PINS_NoMemory_SKYWORKS_6*8*1.15mm                   | 1   |
| 20 | ..... 5 | U700                    | 311-0000-00740    | EUSY0399701    | I.C TRANSCEIVER_AD6548BCPZ_LFCSP_32 PINS_NoMemory_MTK_N/A                                       | 1   |

|    |         |                             |                |             |  |   |
|----|---------|-----------------------------|----------------|-------------|--|---|
| 21 | ..... 5 | U701                        | 311-0000-00787 | EUSY0403101 | I.C LDO_XC6221A282NR_SSOT-24_4 PINS_NoMemory_TOREX_Vo=2.8V,250mA   | 1 |
| 22 | ..... 5 | U800                        | 310-0000-00073 | EQBA0005301 | NPN Epitaxial Planar Transistor -Dual_BC847S_6pin_SOT-363_INFINEON_N/A                                       | 1 |
| 23 | ..... 5 | U801                        | 311-0000-00856 | EUSY0403501 | I.C ANALOG SWITCH_FSA2268TUMX_MLP_10 PIN_NoMemory_FAIRCHILD_DUAL SPDT  | 1 |
| 24 | ..... 5 | DC400                       | 311-0000-00763 | EUSY0400101 | I.C DC-DC CONVERT_TPS62560DRVR_SON_6 PINS_NoMemory_TI_600mA,PWM Adjustable                                   | 1 |
| 25 | ..... 5 | MK400                       | 312-0000-00040 | SUMY0012401 | Omni-MIC_SOM4013SB-Z422-C3310_58 'dB_- 42dB_± 2.0dB_Φ4.0*1.30mm_NA_SMD Type_GONGDA_N/A                       | 1 |
| 26 | ..... 5 | JRF600                      | 314-0000-00016 | ENWY0006901 | CON. ANTENNA CONNECTOR_C90-101-0004_NA_6 pin_SPEED TECH CORP(BEIJING)_For Antenna Switch                     | 1 |
| 27 | ..... 5 | J200                        | 314-0000-00413 | ENRY0010201 | CON. MICRO SD CONNECTOR_473095251_1.100 mm_8 pin_MOLEX_H=5.25mm  | 1 |
| 28 | ..... 5 | J201                        | 314-0000-00358 | ENBY0048501 | CON. FPC CONNECTOR_FH26W-13S-0.3SHW(05)_0.600 mm_13 pin_HIROSE_H=1.0mm                                       | 1 |
| 29 | ..... 5 | J300                        | 314-0000-00437 | ENZY0026701 | CON. EAR PHONE JACK CONNECTOR_7620 ASSEMBLY_Φ3.50 mm for Phone jack_6 pin_CT C_4 Pole                        | 1 |
| 30 | ..... 5 | J301                        | 314-0000-00254 | ENBY0048601 | CON. I/O FEMALE CONNECTOR_HSEJ-18S04-25R_0.400 mm_18 pin_HANSHIN_H=2.5mm                                     | 1 |
| 31 | ..... 5 | J500                        | 314-0000-00382 | ENBY0049401 | CON. SIM CARD CONNECTOR_SIM-06HC3B_2.540 mm_6 pin_OCTEKCONN_H=1.65mm   | 1 |
| 32 | ..... 5 | J600,J601                   | 314-0000-00229 | ENRY0009101 | CON. SPRING CONNECTOR_OG-321022_NA_1 pin_KITAGAWA_N/A  | 2 |
| 33 | ..... 5 | JBAT500                     | 314-0000-00391 | ENBY0050001 | CON. BATTERY CONNECTOR_BTP-03QF4G_3.000 mm_3 pin_OCTEKCONN_H=5.7mm   | 1 |
| 34 | ..... 5 | SAW700                      | 326-0000-00117 | SFSY0038501 | Filter SAW_B39182B9308G110_942.5MHz/1842.5MHz_EPCOS_FOR GSM RX,50/150 OHM-SMD10PIN                           | 1 |
| 35 | ... 3   | LCD                         | 327-0000-00081 | SVLM0037101 | LCD TFT_Transmissive_128x128 Pixels_1.50 inch_IM152FBN5A_LG INNOTEK_262K color, FPC type                     | 1 |
| 36 | ..... 5 | BB SHIELDING CASE           | 415-72130-0005 | ACKA0020501 | CASE_7213_SILVER_STAINLESS STEEL+COPPER-NICKEL-ZINC ALLOY_NA_BB SHIELDING CASE_PLIGHT(JIANGSU)_FRAME+COVER   | 1 |
| 37 | ..... 5 | RF SHIELDING CASE           | 415-72130-0006 | ACKA0020601 | CASE_7213_SILVER_STAINLESS STEEL+COPPER-NICKEL-ZINC ALLOY_NA_RF SHIELDING CASE_PLIGHT(JIANGSU)_FRAME + COVER | 1 |
| 38 | ... 3   | LCM FRAME                   | 415-72130-0007 | MCBA0055901 | HOLDER_7213_SILVER_STAINLESS STEEL_NA_LCM FRAME ASS'Y_PLIGHT(JIANGSU)_N/A                                    | 1 |
| 39 | ... 3   | METAL DOME                  | 415-72130-0012 | ADCA0102101 | DOME_7213_WHITE_STAINLESS STEEL_NA_METAL DOME_PRINTEC_N/A  | 1 |
| 40 | ..... 5 | LED800,LED801,LED804-LED809 | 309-0000-00063 | EDLL0008801 | LED Single Color_19-217/BHC-XL2M2TY/3T_BLUE_2pin_0603_5mA/<28.5mcd_EVERLIGHT_19-21SERIES                     | 8 |
| 41 | . 1     | Headset                     | 333-0000-00067 | SGEY0003728 | Headset Stereo Channel Type_SGEY0003728_16 Ohm_Mic.S/N'58 'dB_- 38 'dB_I-SOUND_Mic. ±3dB,3.5 mm Plug         | 1 |
| 42 | . 1     | Adapter(RUSSIA)             | 331-0000-00107 | SSAD0028501 | Travel Charger_100~240V_4.80V_400mA_CE_STA-P53RS_EN50075_HAN SHIN_SALCOMP_18 pin I/O Plug                    | 1 |
| 43 | . 1     | Battery                     | 306-0000-00060 | SBPL0090501 | Li-ion Battery Cell Packing_3.7V_950mAh_BLACK_LGIP-531A-7115_BYD_Bar code:SBPL0088801                        | 1 |

|     |   |                       |                |             |  |   |
|-----|---|-----------------------|----------------|-------------|--|---|
| 44. | 1 | HANDSET LABEL         | 478-7213RU-001 | MLAA0065701 | HANDSET LABEL_Packing Label_7213_Russia_HIGH TEMP. ART PAPER_SUFFIX RUSSIA_E-L IN(KUNSHAN) | 1 |
| 45. | 1 | MANUAL ASSY,OPERATION | 475-7213RU-001 | AMBA0161801 |  | 1 |
| 46. | 1 | BAG,VINYL(PE)         | 479-00000-0048 | MBAD0005204 |  | 1 |
| 47. | 1 | BOX,UNIT              | 482-7213RU-001 | MBEF0138102 |  | 1 |
| 48. | 1 | LABEL,BARCODE         | 478-7129RU-005 | MLAC0004539 |  | 1 |